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RUN

THE COMMODORE 64/128 USER'S GUIDE

July 1988
An IDGC/I Publication

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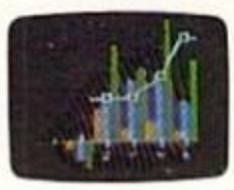

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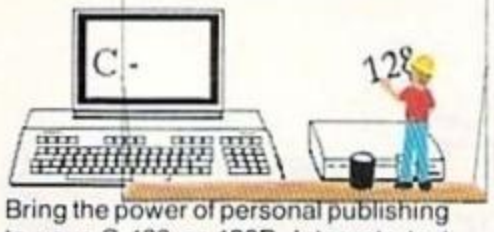

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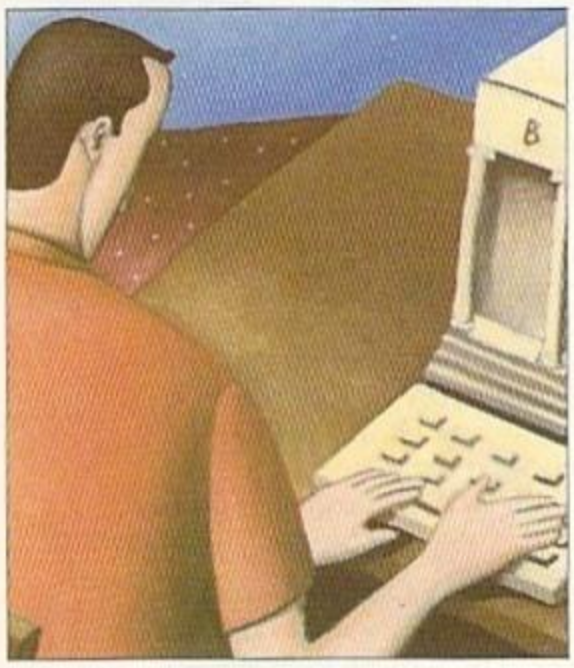
CONTENTS

VOLUME 5, NUMBER 7

JULY 1988

PAGE 40



PAGE 77

COVER ILLUSTRATION BY MERLE NACHT

COVER SCREEN SHOTS:
"Middle Earth" by Wayne Schmitt
"Knight" by Wayne Lorentz
"Lighthouse" by Michael J. Manzer

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FEATURES

40 GRAPHICS GALORE *by Lou Wallace*
Take a look at thirteen graphics programs.

46 PIXEL PERFECTION *by Tim Walsh*
Meet seven Commodore computer artists whose works you may have seen.

49 ALPHABET CADET* *by John Ryan*
Quick reflexes and fast thinking will win this vocabulary game.

54 THE AMAZING SIXTEEN-COLOR PRINT MACHINE* *by Ted Davis*
Get sixteen colors from a black-and-white Epson- or Star-compatible printer.

59 COLOR CORNUCOPIA* *by Tim Walsh*
Spice up your C-128's 80-column screen with varied rainbows of color.

60 READY. . .SET. . .COMPILE! *by Lou Wallace*
RUN's resident reviewer checks out nine compilers.

66 BILL MINDER* *by Jerome Reuter*
Are you living beyond your means?

70 TRAVEL TALLY* *by Kenny Lawson*
Keep track of your travelling expenses.

74 EVEL'S REVENGE* *by Curtis Kaylor*
How many barrels can *you* safely jump over?

DEPARTMENTS

4 RUNNING RUMINATIONS
Editorial surveys reveal the *RUN* reader.

10 MAGIC *by Tim Walsh*
The original column of hints and tips for performing Commodore computing wizardry.

18 NEWS AND NEW PRODUCTS
Recent developments and releases in the world of Commodore computing.

20 *RUN*'S READER CHOICE AWARDS BALLOT
You still have time to vote for your favorite software. But hurry!

24 MAIL RUN
Input from our readers.

28 SOFTWARE GALLERY *Reviews of:*

- Chernobyl
- Demon Stalkers
- Mini-Putt
- Soko-Ban
- Screen F/X
- Commando
- Border Zone
- Project: Space Station

76 TYPE-IN TROUBLES?
Troubleshooting tips for entering listings.

77 EASY APPLICATIONS* *by Lou Wallace*
This month: Computing interest and principal on loan payments.

79 COMMODORE CLINIC *by Lou Wallace*
Got a problem or question related to Commodore computing? This monthly column provides the answers.

82 TELECOMPUTING WORKSHOP *by Loren Lovhaug*
Information and advice on all aspects of telecommunications.

84 GEOWATCH *by Susan Lamb*
RUN's column for users of GEOS.

85 COMMONSENSE APPROACH TO COMPUTING

86 HARDWARE GALLERY *Reviews of:*

- Hot Shot Plus
- Personal Musician

88 MEGA-MAGIC* *by Kenny Lawson*
Retrieve files from your accidentally reformatted disks.

95 *RUN*'S CHECKSUM PROGRAM

96 COMING ATTRACTIONS; LIST OF ADVERTISERS

* This article contains a program listing. The program is also available on the July/August ReRUN disk. To order, see page 17.

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PUBLISHER
STEPHEN ROBBINS

EDITOR-IN-CHIEF
DENNIS BRISSON

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SWAIN PRATT

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CONTRIBUTING EDITORS
ROBERT KODADEK; ROBERT ROCKEFELLER

ART DIRECTOR
ROSSLYN A. FRICK

ASSISTANT ART DIRECTOR
HOWARD G. HAPP

DESIGNERS
ANNE DILLON
ROGER GOODE

PRODUCTION/ADVERTISING SUPERVISOR
RUTH BENEDICT

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ADVERTISING SALES MANAGER
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SALES REPRESENTATIVES
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CLASS AD SALES-EAST COAST
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603-924-9471

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WEST COAST OFFICE:

SALES MANAGER
GIORGIO SALUTI

CLASS AD SALES
DANNA CARNEY

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PALO ALTO, CA 94303
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MARKETING MANAGER
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RUNning Ruminations

Did You Know?

***Commodore users rely on magazine articles as their most valuable source of information about computing and buying software and hardware.**

***A greater percentage of C-128 owners use their computers for telecommunications than 64 owners.**

***Commodore users are more apt to purchase their software or hardware through mail-order than any other source.**

These are some of the findings about readers, their computer applications, preferences and buying habits that we gleaned from *RUN*'s recent editorial survey.

The elusive RUN reader is finally captured in the latest editorial survey.

Each year we seek to learn *more* about you, the *RUN* reader. In this annual survey, which was sent to 1000 subscribers, we closely monitored changes in computer use and reader demographics from previous years.

Who Reads *RUN*?

While we realize that no two readers are alike, there are some generalizations we can make about those who read *RUN*:

—the C-64, the most popular computer in the world, is still the computer of choice for most of our readers (70%); 43% use the C-128; while some users continue to use both systems.
—readers' primary applications are entertainment and word processing, followed by home applications and programming.
—the 128 is used more for productivity applications than the C-64.
—almost all readers use the 5¼-inch disk drive with their systems, while the second and third most used peripherals are joysticks and dot matrix printers.
—more than one-half of our readers enter almost every program or at least an occasional program published in *RUN*.
—the C-128 (not the Amiga) is the computer of choice for users planning on purchasing another computer.
—the average reader is male, 42 years old, attended college and has a household income of over $36,000.

While home entertainment is one of the two main applications for which Commodores are typically used, readers want to do more than just play games with their machines. The typical *RUN* reader is interested in learning how to use his/her computer for personal productivity (word processing, database management, spreadsheet calculations, telecommunications, etc.). Many *RUN* readers also use GEOS and are interested in learning about new products for their Commodore systems.

The results of this survey indicate that the Commodore eight-bit market is very much alive and that *RUN* has developed the most active and involved audience in the industry. We will continue to serve this marketplace and fine-tune our editorial to meet the needs of our readers in coming issues.

Dennis Brisson

Dennis Brisson
Editor-in-Chief

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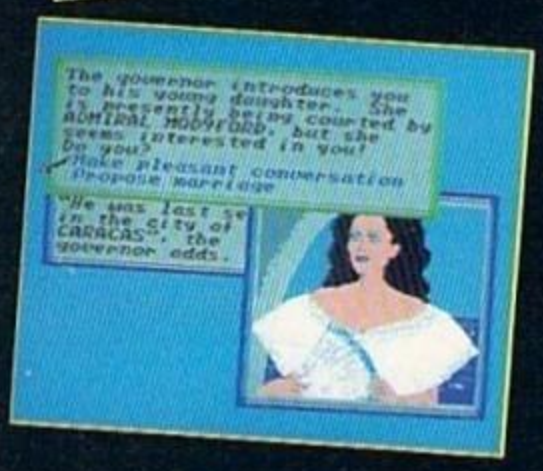
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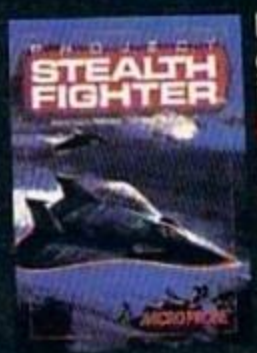

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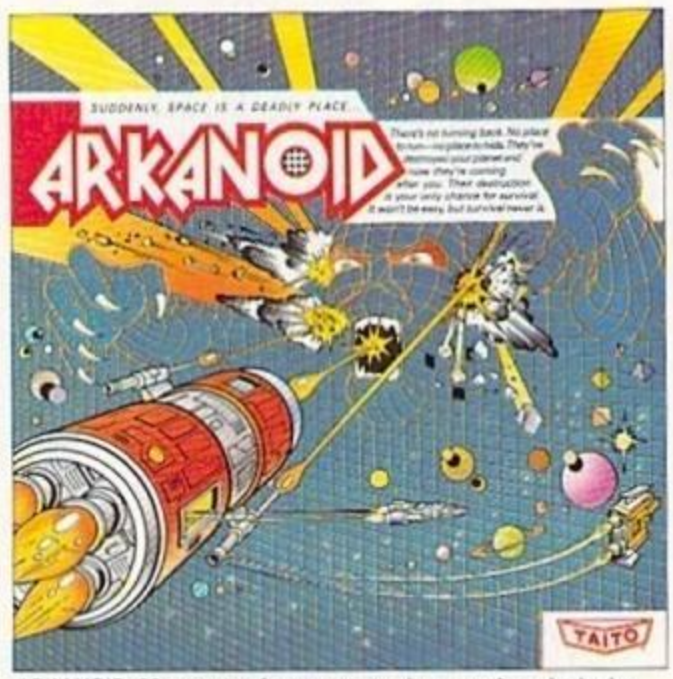

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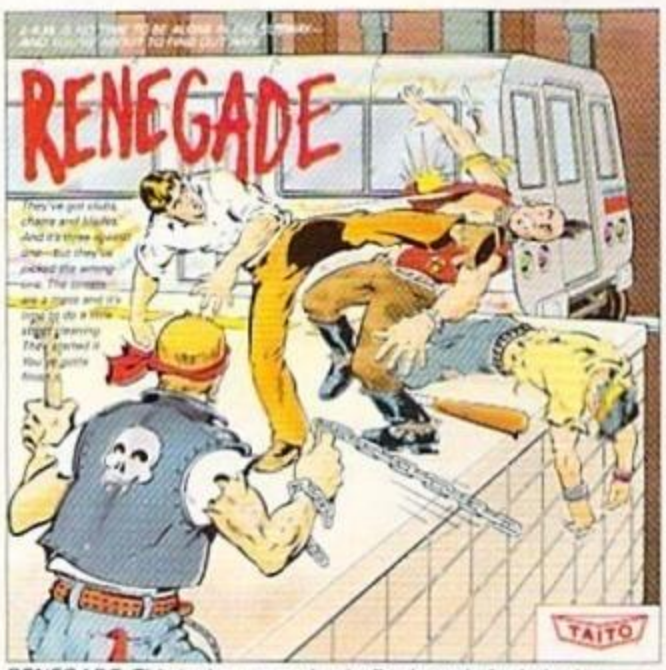

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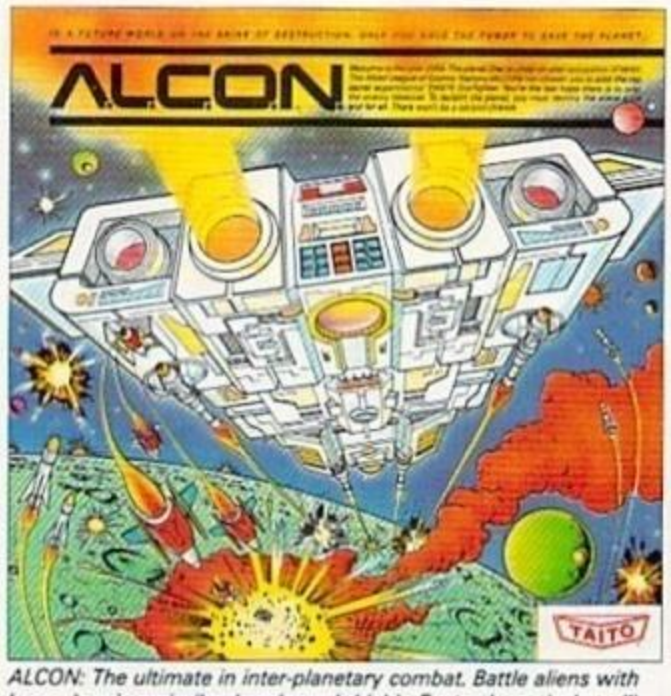

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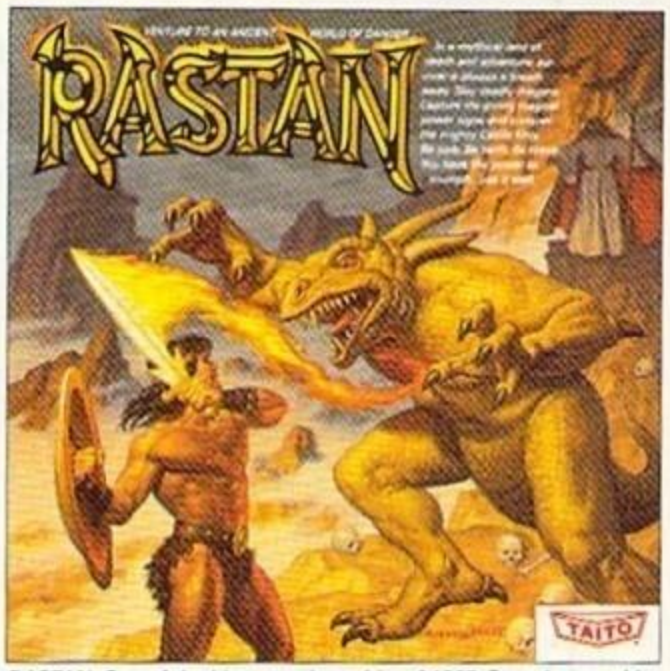

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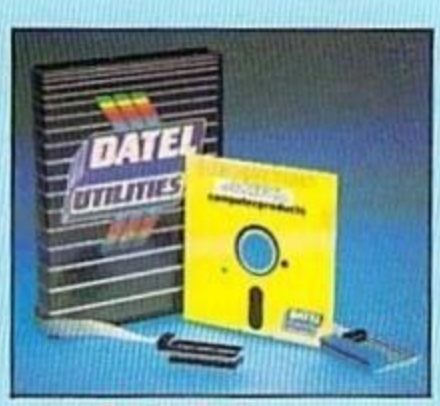

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MAGIC

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Compiled by TIM WALSH

$4A6 RAPID FACTORS

Magic Trick $454, Factor Finder (*RUN*, December 1987) fills an important niche as a handy factor program, but it's so slow that it is virtually useless for testing whether a very large number is prime. For instance, Factor Finder requires over 2½ hours to confirm that 675,643 is prime.

Using my Rapid Factors program (for either the C-64 or the C-128) results in a great increase in calculation speed over Factor Finder. After typing in and running my program, you can test 675,643 for factors in less than nine seconds. As another startling example, the largest prime number Rapid Factors is capable of testing (999,999,937) required 6½ minutes with my program (or about 3½ minutes using the C-128's Fast mode). By contrast, it would take Factor Finder almost *five months* to do the job!

```
Ø REM FASTER FACTOR FINDER - BOB PITKIN SR
                                        :REM*1Ø
1Ø PRINT:INPUT"ENTER A NUMBER";N:N1=N
                                        :REM*38
2Ø IFN=Ø THENEND                        :REM*94
3Ø IFN<1ORINT(N)<>NTHENPRINT"ONLY WHOLE NU
   MBERS GREATER THAN Ø":GOTO1Ø         :REM*166
4Ø FOR FP= 2 TO SQR(N)                  :REM*121
5Ø IFN/FP=INT(N/FP)THENPRINTFP"*";:Z=1:N=N
   /FP:GOTO 4Ø                          :REM*33
6Ø NEXT:PRINTN"="N1:GOTO 1Ø             :REM*95
```

—BOB PITKIN, SR., OZONA, FL

$4A7 MAGIC TRICK TITLE HIGHLIGHTER

Here's an easy way to highlight the first line in Magic programs typed in from any 1988 issue of *RUN*. Load the program in 64 mode (C-64 programs only), insert an extra space after the REM in line 0, then enter the following in Direct mode:

```
POKE 2055,18
```

Now save the program. Whenever you list the modified version of the program, line 0 will appear in reversed video. You'll find that programs modified this way will also display the same changes in line 0 when loaded into C-128 40- and 80-Column modes.

—RICHARD PENN, MONTREAL, QUEBEC, CANADA ►

TRICK OF THE MONTH

$4A8 C-128 80-COLUMN SCREEN PRINTER

Here's an easy way to make a hard copy of the C-128's 80-column screen. Type in 80-Column Screen Printer, save a copy, and then run it in 80-Column mode. When you press the shifted British pound sign, it will send all the screen characters (except graphics characters) to your printer.

```
Ø REM C-128 8Ø-COLUMN SCREEN PRINT - MIKE
  CORRIGAN                              :REM*18
1Ø FORT=2816 TO 3Ø62:READD:POKET,D:CK=CK+D
   :NEXT                                :REM*1Ø5
2Ø IFCK<>278Ø5 THEN PRINT"ERROR IN DATA...
   ":END                                :REM*25
3Ø SYS 3Ø52                             :REM*131
4Ø DATA 169,Ø,133,251,133,252,76,61,11,169
   ,18,16Ø,Ø,14Ø,Ø,255,141,Ø,214        :REM*231
5Ø DATA 44,Ø,214,16,251,142,1,214,96,169,1
   9,16Ø,Ø,14Ø,Ø,255,141,Ø,214          :REM*225
6Ø DATA 44,Ø,214,16,251,142,1,214,96,162,3
   1,142,Ø,214,44,Ø,214,16,251          :REM*43
7Ø DATA 173,1,214,96,169,4,162,4,16Ø,5,32,
   186,255,169,Ø,32,189,255,32          :REM*61
8Ø DATA 192,255,162,4,32,198,11,166,252,32
   ,9,11,166,251,32,28,11,32,47         :REM*142
9Ø DATA 11,2Ø1,91,176,36,2Ø1,32,144,26,24,
   2Ø1,64,176,21,32,21Ø,255,23Ø         :REM*96
1ØØ DATA 251,165,251,2Ø1,Ø,2Ø8,219,23Ø,252
    ,165,252,2Ø1,7,176,14,144,2Ø9       :REM*94
11Ø DATA 24,1Ø5,64,76,1Ø9,11,24,1Ø5,32,76,
    1Ø9,11,166,252,32,9,11,166,251      :REM*94
12Ø DATA 32,28,11,32,47,11,2Ø1,91,24Ø,33,2
    Ø1,32,144,23,24,2Ø1,64,176,18       :REM*46
13Ø DATA 32,21Ø,255,23Ø,251,165,251,2Ø1,2Ø
    8,2Ø8,219,32,2Ø1,11,32,231,255      :REM*2Ø7
14Ø DATA 96,24,1Ø5,64,76,168,11,24,1Ø5,32,
    76,168,11,32,2Ø1,255,169,27,32      :REM*139
15Ø DATA 21Ø,255,169,64,32,21Ø,255,96,2Ø1,
    169,24Ø,3,76,173,198,32,Ø,11        :REM*97
16Ø DATA 96,77,73,75,69,32,67,79,82,82,73,
    71,65,78,169,212,141,6Ø,3,169       :REM*172
17Ø DATA 11,141,61,3,96                 :REM*74
```

—MICHAEL A. CORRIGAN, CARROLLTON, TX

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$4A9 Alarming Time-Keeper 128

Time-Keeper 128 (see Easy Applications, March 1988) is a remarkably bullet-proof, 40- and 80-Column mode clock/calendar whose programmable alarm operates under a variety of conditions. While the program seems invincible, it cries out for the ability to reset the alarm before or after ringing. You can give it that capability by running a new program consisting of lines 5–9 and 21–34 of the boot program.

However, resetting the alarm in this manner zeroes the seconds on the clock after you've made the last alarm entry. To circumvent this, press return at the AM-PM setting just as the clock begins a new minute at 00 seconds.

Another problem is that on rare occasions the new program accidentally sounds the alarm immediately after you reset it. If it does, turn it off and reset it again. Finally, although the clock's characters are the same as the screen-character colors, you can use ESC and then T to set a window one line down from the top of the screen and use different character colors for the clock.

—Richard D. Young, Orleans, Ontario, Canada

$4AA Lottery Winner!

Lottery fans, rejoice! This program (compatible with all Commodores) produces non-repeating numbers randomly selected from a user-defined numeric range. You can direct its output to screen or printer.

```
Ø REM LOTTERY WINNER - JOSEPH R. CHARNETSK
  I                                    :REM*9Ø
1Ø INPUT"{SHFT CLR}HOW MANY NUMBERS";T
                                       :REM*236
2Ø INPUT"LOWER LIMIT";L                 :REM*6
3Ø INPUT"UPPER LIMIT";H                :REM*2Ø3
4Ø INPUT"(S)CREEN OR (P)RINTER";D$:REM*125
5Ø R=H-L+1:IF T>R THEN T=R             :REM*116
6Ø DIM N(T):IF D$="P" THEN OPEN4,4:CMD4
                                       :REM*2Ø2
7Ø FOR I=1 TO T                         :REM*86
8Ø S=INT(RND(.)*R+L)                    :REM*56
9Ø FORJ=1 TO I                          :REM*58
1ØØ IFS<>N(J) GOTO 12Ø                  :REM*64
11Ø J=I:GOTO 8Ø                         :REM*37
12Ø NEXT:PRINT STR$(I);CHR$(41);S       :REM*34
13Ø N(I)=S:NEXT                        :REM*188
14Ø IF D$="P" THEN PRINT#4:CLOSE4      :REM*164
```

—Joseph Charnetski, Dallas, PA

$4AB Organizing BBS Directories

As a 65-year-old bulletin board sysop perched at the edge of the Smokies, I found Magic trick $464 by Lou Wallace essential in my BBS work for writing Basic programs to disk as sequential files. I've expanded upon the trick and can now create linked directories for the bulletin section of my BBS.

Here's how it works: Place a BBS file disk with a hundred or more blocks free in your drive and enter:

```
LOAD"$",8
```

When the cursor reappears, *do not clear the screen.* Instead, type in the following:

```
OPEN8,8,8,"INDEX,S,W":CMD8:LIST
```

As soon as the cursor appears again, type in:

```
PRINT#8:CLOSE8
```

Now for the magic. Move the cursor back up to the LOAD"$",8 command, which should still be visible at the top of your screen. Replace the first disk with the second disk to be organized, and press return. When the directory is finished loading, the cursor will appear over the Open statement above. Now put the first disk back in the drive and change the W to an A in the INDEX,S,W statement above and press return. Finally, press return again when the cursor reappears on the PRINT#8 statement.

By using this method, you can append the directories of all your 1541, 1571, 1581 and even SFD 1001 disks into one file. If you're lucky enough to have a two-drive system, you can change the Open statement to OPEN8,9,8 and keep the destination disk in drive 9 while loading directories from drive 8.

Of course, you'll need some way to view this sequential file. For screen or printer output, type in the following five lines, save them to disk and run as needed:

```
1 PRINTCHR$(147):INPUT"FILENAME OF FILE INDEX";F$
2 INPUT"PRINT Y/N";R$:D=3:IFR$="Y"THEN D=4:S=7
3 OPEN1,8,2,F$+"S,R":OPEN4,D,S:PRINTCHR$(147)
4 GET#1,A$:IFST=0THENPRINT#4,A$:WAIT198,1,1:POKE 198,0:
  GOTO4
5 PRINT#4:CLOSE1:CLOSE4:INPUT"ANOTHER Y/N";Q$:IFQ$=
  "Y" THEN 1
```

—Jim Sanders, Knoxville, TN

$4AC 1541 Software Soup-Up

Would you like to increase the speed of your disk drive's head movement? Just incorporate the following line in any program:

```
OPEN 15,8,15:PRINT#15,"M-W"CHR$(7)CHR$(28)CHR$(1)
CHR$(15)
```

This command offers small increases in the speed of Validate, Rename and Scratch commands; all other drive commands are unaffected.

—Barry Solomon, Montoursville, PA

$4AD C-64 Worry-Free Binary Load

A binary file is a machine language program or section of memory saved to disk and loaded into memory using the LOAD"FILENAME",8,1 syntax. Unfortunately, there are problems associated with loading programs using ,8,1 at the end of the Load statement. Its presence affects Basic pointers, interrupts the execution of other programs already in memory and causes numerous other maladies.

Whenever you need to load a binary file without disturbing existing memory configurations, use the following line in either Direct or Program mode:

```
OPEN1,8,1,"FILENAME,P,R":POKE780,0:SYS65493:CLOSE1
```

—Richard Penn, Montreal, Quebec, Canada

$4AE Counting 1581 Files

I recently discovered that my now-famous disk utility, File Counter (Magic, August 1987), wasn't compatible with the Commodore 1581 3½-inch disk drive. I've revised the program into a new program called File Counter 1581. It's an essential tool for 1581 users. ►

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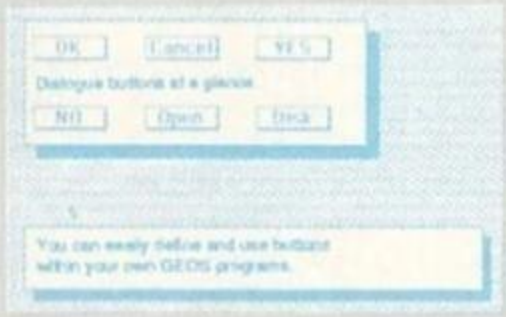

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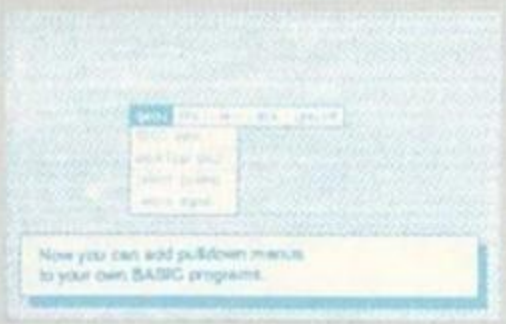

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Before using the program, be sure your 1581's disk is in the desired partition; then run my program. Since the 1581 possesses an impressive capacity of 295 files, counting a full 3½-inch disk requires two minutes. While that might not sound so fast, try manually counting all the files on a full directory. It's brutal!

```
Ø REM FILE COUNTER-LEO BRENNEMAN    :REM*4Ø
5 PRINT"{SHFT CLR} COUNTING 1581 FILES..."
                                    :REM*213
1Ø CLR:OPEN 2,8,96,"$Ø":REM CHANGE '8' TO
   '9' IF 1581 IS DRIVE #9          :REM*212
15 GET#2,A$,A$                      :REM*2Ø9
2Ø GET#2,A$,B$:IFA$=""ANDB$=""THENCLOSE2:G
   OTO5Ø                            :REM*1Ø8
25 GET#2,A$,A$                      :REM*235
3Ø FORJ=1TO27:GET#2,A$               :REM*92
35 IFA$=""THEN 2Ø                   :REM*166
4Ø NEXT:N=N+1:GOTO3Ø                 :REM*78
45 CLOSE2                           :REM*48
5Ø PRINT"THERE ARE"N"FILES ON THIS DISK."
                                    :REM*184
```

—Leo W. Brenneman, Erie, PA

$4AF Printing 1581 Pic Demos

Any C-128 user who has a 1581 disk drive, a second drive and a copy of the C-128 Screen Dump program published in the March 1987 issue of *RUN* can print out some of those fabulous screens from the 1581 Pic Demo.

In 80-Column mode, load Pic Demo 128 from the 1581 Demo disk that came with your drive. Next, switch to 40-Column mode with ESC X. When the picture you want to print scrolls into sight, press the run-stop key. Now switch the video monitor to 80-Column mode, and load and run C-128 Screen Dump from your second drive.

Press ESC X to return to the 40-column screen again, and press F8 to print your hi-res screen. After printing, you should continue running Pic Demo 128 so that the 1581 will exit that partition and return to the root directory.

—Terry J. Jinings, Plattsmouth, NE

$4B0 A Cure for the Data Statement Blues

Countless C-64 users will appreciate this sure-fire cure for finding those Out-of-Data and Error-in-Data-Statement problems. Just place the following routine at the end of any program, such as *RUN*'s Checksum, that contains Data statements:

```
300 FOR Z = 1TO250:READA:PRINT(PEEK(64)*256) + PEEK(63),A
310 GET X$:IF X$ = "" THEN 310
320 GOTO 300
```

This is a remarkably flexible routine. I begin this program with line number 300 because *RUN*'s Checksum ends well before line 300, but you can use any line number desired, as long as it's higher than the program's last line number. The 250 in the For-Next loop can be any number larger than the number of Data statements. If you're unsure, use a large number such as 50000.

After installing this routine, enter RUN 300 (the first line number in the routine) and press return. The first line number containing Data statements appears, followed by the first Data statement. Check it against the magazine listing for errors, then press a key to examine the next line number and Data statement.

If you find an error, press the run-stop key and list the line in error. Make the correction and enter GOTO 300 to continue. When you're finished, delete the routine by entering its line numbers and pressing return. You can then run your program normally.

—Dave Goss, Kansas City, MO

$4B1 Help = UnNew 128

If you've ever experienced the agony of entering the New command, only to discover you hadn't saved the program first, then you'll love this UnNew routine for your C-128. After loading and activating this utility, press the Help key any time you want to retrieve a program that you accidentally New'ed.

```
Ø REM C-128 UNNEW - LARRY S. ROBERTS
                                    :REM*45
1Ø FOR AD=512Ø TO 5233:READ DA:POKE AD,DA:
   CK=CK+DA:NEXT AD                 :REM*187
2Ø IF CK<>11Ø87 THEN PRINT"ERROR IN DATA":
   END                              :REM*171
3Ø SYS512Ø                          :REM*114
4Ø DATA 76,21,2Ø,165,45,133,251,165,46,133
   ,252,16Ø,Ø,169,1,145,251,32      :REM*12Ø
5Ø DATA 229,94,96,162,Ø,228,215,24Ø,2,2Ø8,
   14,32,66,193,24,162,1,16Ø,11     :REM*68
6Ø DATA 32,24Ø,255,76,54,2Ø,32,66,193,24,1
   62,1,16Ø,3Ø,32,24Ø,255,32,125    :REM*236
7Ø DATA 255,85,78,78,69,87,32,79,78,32,18,
   72,69,76,8Ø,146,32,75,69,89,Ø    :REM*14
8Ø DATA 169,Ø,169,97,133,252,169,2Ø,133,25
   3,169,252,162,1Ø,16Ø,8,32,1Ø1    :REM*2Ø2
9Ø DATA 255,96,83,89,83,53,49,5Ø,51,13,1,Ø
   ,Ø,Ø,Ø,51,44,5Ø,Ø                :REM*47
```

—Larry S. Roberts, Casselberry, FL

$4B2 Combining C-64 Program Lines

Programmers occasionally need to combine lines of Basic 2.0 to conserve memory or to make room for more program lines. The following routine combines a line of Basic with the next line in a listing, up to 255 characters in length. Be careful not to exceed 255 characters, or you could lose the entire program. To safely use this routine, append it to the end of your program in the format as it appears below. And always place a Stop command in a line before the routine to prevent accidentally executing it. Run the sample program below to join line 20 with line 30.

```
Ø REM C-64 LINE JOINER - ROLF L. MILLER
                                    :REM*239
1Ø REM LINE 2Ø WILL JOIN WITH LINE 3Ø AFTE
   R RUNNING.                       :REM*2Ø3
2Ø PRINT"THIS WAS LINE 2Ø";          :REM*99
3Ø PRINT"THIS WAS LINE 3Ø":         :REM*1Ø6
59999 STOP                           :REM*5
6ØØØØ INPUT"LINE NUMBER TO APPEND";LN:A=2Ø
      49                            :REM*43
6ØØ1Ø L=PEEK(A+2)+PEEK(A+3)*256    :REM*246
6ØØ2Ø A=PEEK(A)+PEEK(A+1)*256:IF L<>LN GOT
      O 6ØØ1Ø                       :REM*2
6ØØ3Ø FOR X=A-1 TO A+3:POKE X,58:NEXT:SYS ►
```


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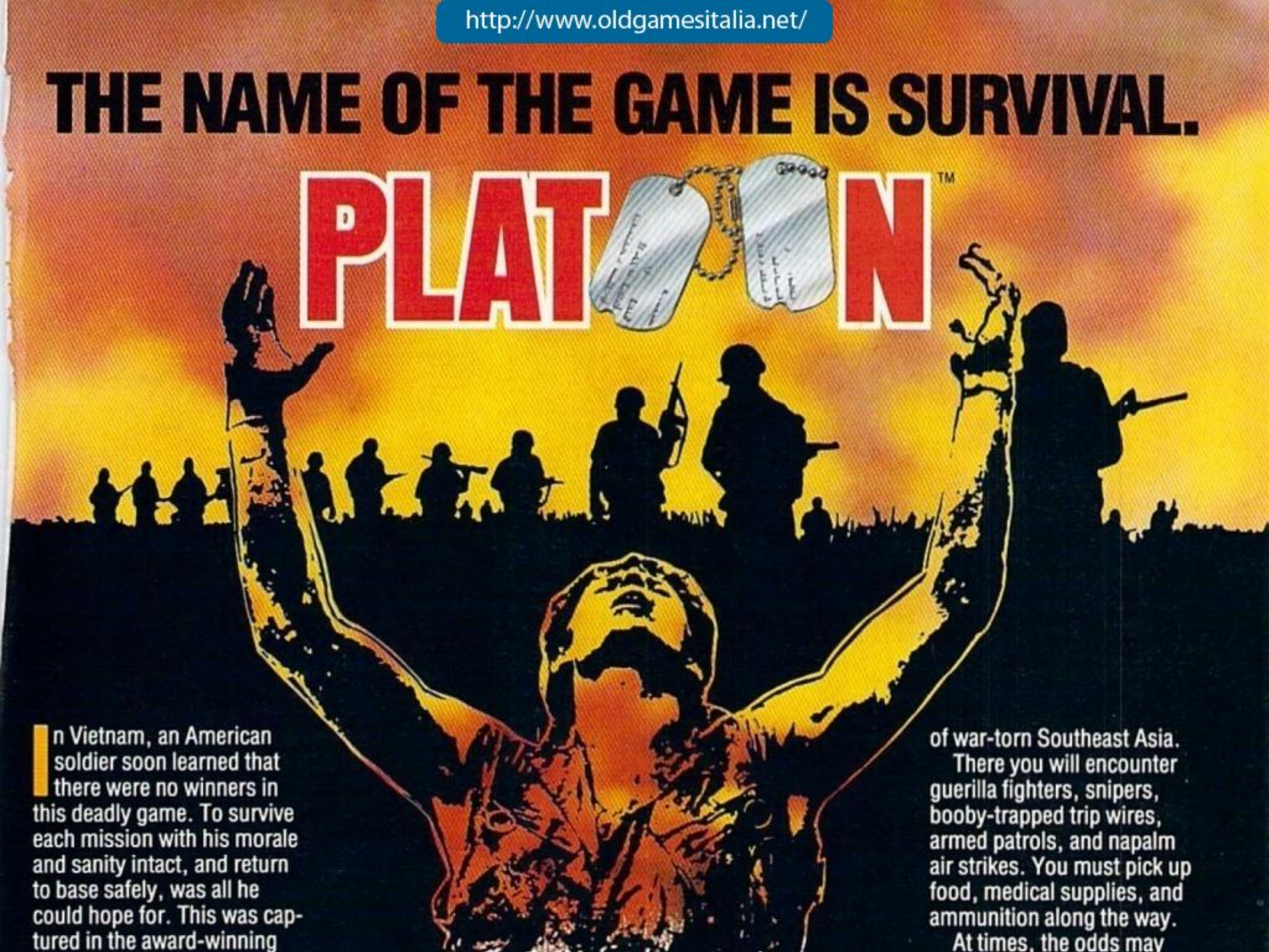

In Vietnam, an American soldier soon learned that there were no winners in this deadly game. To survive each mission with his morale and sanity intact, and return to base safely, was all he could hope for. This was captured in the award-winning film, Platoon.

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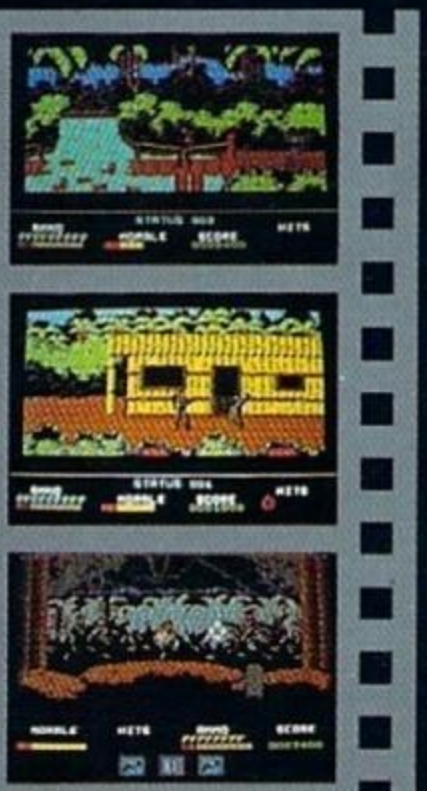

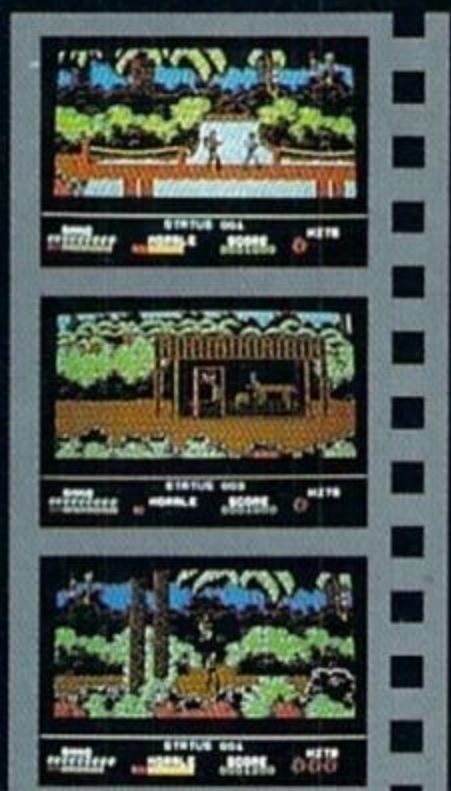

DATA EAST

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```
42291:STOP                                :REM*212
```

—ROLF L. MILLER, VENTURA, CA

$4B3 APPENDING C-64 BASIC PROGRAMS

Commodore 64 programmers and non-programmers alike frequently need to combine one program with another. Unfortunately, it's tedious work.

My program makes it a snap. Type in 64 Easy Append, save it to disk, then run it. Next, make sure the line numbers in the second program are higher than those in the first program. Use a renumbering utility if necessary. Load in the first program, then enter the following:

```
@LOAD"second program",8
```

"Second program" is, of course, the filename of the second program to be appended to the first. You'll find that 64 Easy Append runs until the computer is turned off.

```
Ø REM C-64 EASY APPEND - RICHARD PENN
                                          :REM*132
1Ø FOR T=679 TO 757:READD:POKET,D:CK=CK+D:
   NEXT                                   :REM*111
2Ø IFCK<>8975THENPRINT"ERROR IN DATA...":E
   ND                                     :REM*31
3Ø SYS 747: PRINTCHR$(147)"TO APPEND: @LOA
   D "CHR$(34)"FILENAME"CHR$(34)",8"
                                          :REM*74
4Ø DATA 72,165,2,2Ø1,1,2Ø8,12,169,Ø,133,2,
   165,253,133,43,165,254,133             :REM*179
5Ø DATA 44,173,Ø,2,2Ø1,64,2Ø8,38,169,58,14
   1,Ø,2,56,165,45,233,2,133              :REM*73
6Ø DATA 251,165,46,233,Ø,133,252,165,43,13
   3,253,165,44,133,254,165,251           :REM*85
7Ø DATA 133,43,165,252,133,44,169,1,133,2,
   1Ø4,76,124,165,169,167,141,4           :REM*167
8Ø DATA 3,169,2,141,5,3,96                :REM*88
```

—RICHARD PENN, MONTREAL, QUEBEC, CANADA

$4B4 ALL-PURPOSE 64 INSTRUCTION CREATOR

Anyone who has written a program requiring built-in instructions will appreciate my program, 64 Instruction Creator. What makes it unique is that no Print statements, Data statements or REMs are needed for the lines containing instructions, and they can be directed to the printer, disk or screen!

Examine the listing of 64 Instruction Creator, and you'll note that instructions can be placed anywhere following line 80. Try experimenting with the program, and you'll soon find it an indispensible utility for placing instructions in all the programs that you design.

```
Ø REM ALL-PURPOSE LISTER - NICKEY MACDONAL
  D                                       :REM*151
1Ø PRINT"{SHFT CLR}{CRSR DN}SCREEN, PRINTE
   R OR DISK (S,P,D)";                    :REM*171
2Ø GETA$:DV=-3*(A$="S")-4*(A$="P")-8*(A$="
   D"):IFDV=ØTHEN2Ø                       :REM*16
3Ø PRINTA$:IFDV=8THENINPUT"FILENAME";FI$:O
   PEN5,DV,5,"Ø:"+FI$+",S,W":GOTO5Ø:REM*76
4Ø OPEN5,DV                               :REM*119
5Ø A$=CHR$(141)+"G{SHFT O}8Ø"+CHR$(13)
                                          :REM*171
6Ø FORZ=1TOLEN(A$):POKE63Ø+Z,ASC(MID$(A$,Z
   ,1)):NEXT:POKE198,Z-1                  :REM*13
7Ø POKE22,35:CMD5:LIST1ØØ-                :REM*74
8Ø POKE22,25:PRINT#5:CLOSE5:PRINT"{CRSR UP
   }{1Ø SPACEs}":PRINT"DONE.":END          :REM*85
9Ø INSTRUCTIONS FOR USAGE:                :REM*7
1ØØ YOU'LL BE ABLE TO SEND SAMPLE LINES
                                          :REM*156
11Ø SUCH AS THESE TO SCREEN, PRINTER OR
                                          :REM*84
12Ø DISK. REMOVE POKE 22,35 IN LINE 7Ø
                                          :REM*147
13Ø IF YOU WANT LINE NUMBERS.             :REM*77
```

—NICKEY MACDONALD, FREDERICTON, N.B., CANADA

$4B5 EASY TYPO CORRECTION

Everyone's made mistakes typing in C-64 programs. My short interrupt-driven program will list an offending line to the screen so that you can cursor up to it, make the correction(s), press return, and then continue.

Be sure you save the program, because the New command in line 40 erases it once it has run.

```
Ø REM C-64 ERROR DETECTOR - BRET TIMMINS
                                          :REM*25Ø
1Ø FORT= 679 TO 745:READA:CK=CK+A:POKET,A:
   NEXT                                   :REM*97
2Ø IF CK<> 7Ø27 THEN PRINT"ERROR IN DATA S
   TATEMENTS...":END                      :REM*144
3Ø SYS 679                                :REM*179
4Ø NEW: REM SAVE THIS PROGRAM BEFORE RUNNI
   NG!                                    :REM*254
5Ø DATA 169,188,141,Ø,3,169,2,141,1,3,169,
   214,141,2,3,169,2,141,3                :REM*22Ø
6Ø DATA 3,96,36,157,16,3,76,139,227,224,29
   ,176,249,165,57,133,2Ø,165             :REM*237
7Ø DATA 58,133,21,169,1,141,233,2,2Ø8,234,
   173,233,2,2Ø8,3,76,131                 :REM*178
8Ø DATA 164,169,Ø,141,233,2,32,19,166,76,2
   Ø1,166,Ø                               :REM*235
```

—BRET M. TIMMINS, SANDY, UT

$4B6 SYMMETRIC C-128 MOIRE PATTERNS

Moire patterns consist of closely knit lines that form beautiful computer-generated designs. Here's a short program for the C-128 in 40-Column mode that creates dazzling random moire patterns. Watching this program form the lines is also an unexpected delight.

```
Ø REM SYMMETRIC MOIRE - BOB HOFER :REM*2Ø8
1Ø GRAPHIC1,1:COLORØ,1:COLOR1,2:COLOR4,1
                                          :REM*6Ø
2Ø X=32Ø:Y=2ØØ                            :REM*61
3Ø C=X*RND(Ø):D=Y*RND(Ø)                  :REM*15
4Ø A=Ø:B=Ø:J=Ø:K=1:N=2:P=1                :REM*12
5Ø DRAW K,A,JTOC,DTOA,Y                   :REM*23Ø
6Ø DRAW J,A+K,JTOC,DTOA+K,Y               :REM*6Ø
7Ø A=A+N:IFA<XTHEN5Ø                      :REM*194
8Ø DRAW K,J,BTOC,DTOX,B                   :REM*138
9Ø DRAW J,J,B+KTOC,DTOX,B+K               :REM*253
```

Continued on p. 88.

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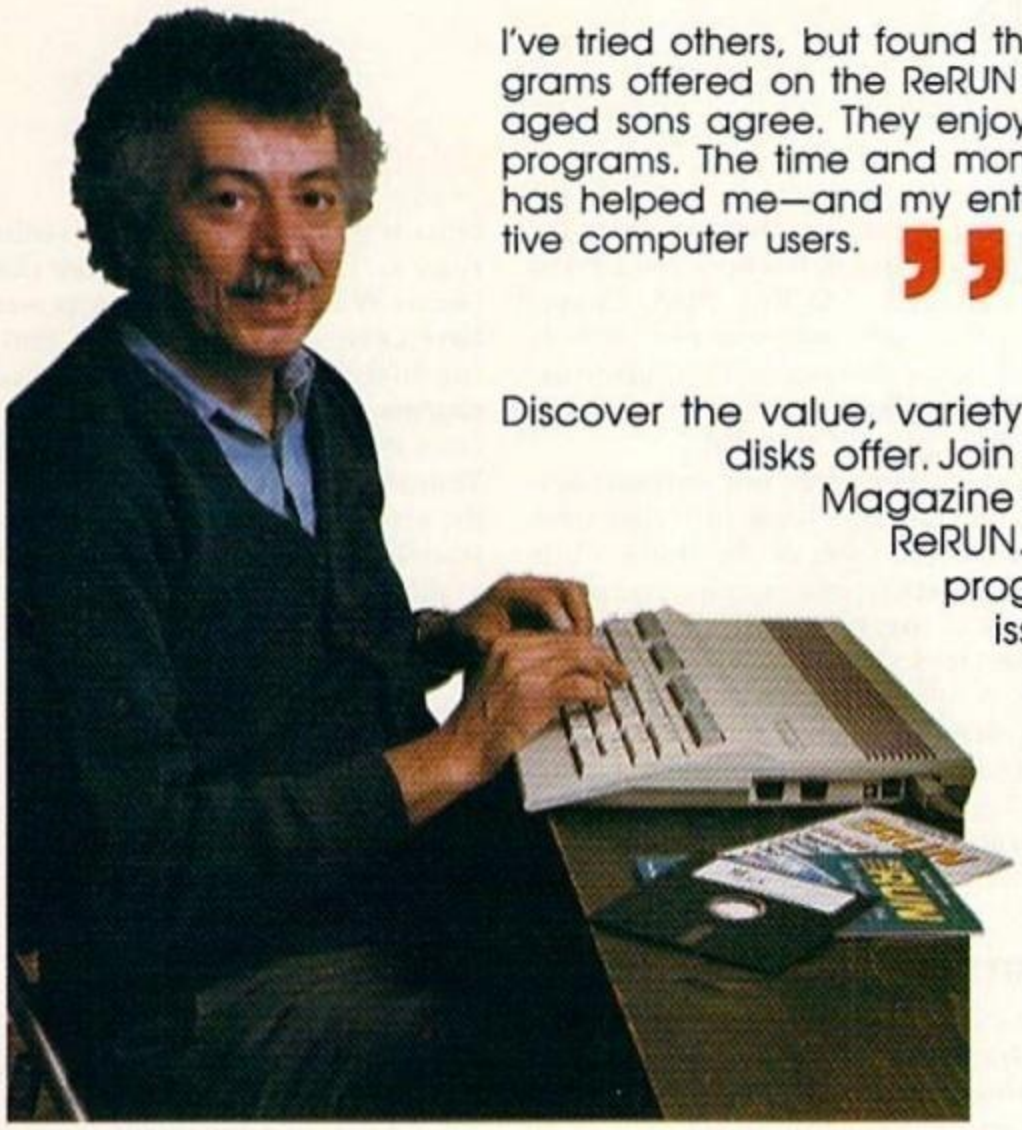

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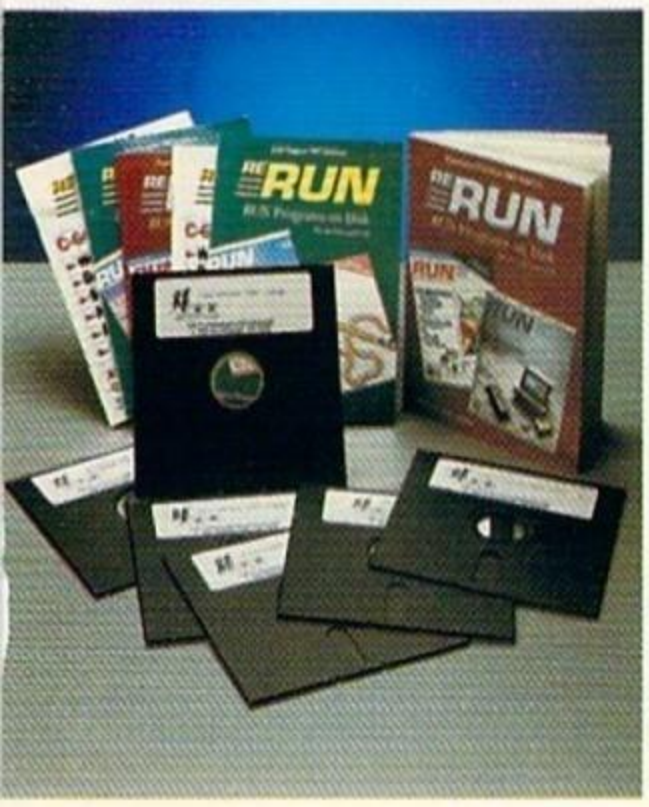

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NEWS AND NEW PRODUCTS

Buy a house for your mouse; send away for free software; get help with frustrating text-adventure games.

Compiled by HAROLD R. BJORNSEN

FREE SOFTWARE

CHARLOTTE, NC—Commodore 64 users can get free software each time they buy a specially marked box of Bonus disks from Verbatim (1200 WT Harris Blvd., Charlotte, NC 28213). To receive the software, buyers simply mail $1 for shipping and handling, along with the coupon that comes inside the 10-packs of Bonus 5¼-inch single-sided, double-density, double-sided, double-density or double-sided, high-density disks. The suggested retail price of each 10-pack is $9.25, $10 and $23, respectively. Buyers can choose from Sinbad's Gammon, a backgammon game; Investicalc, featuring eight common financial calculations; and Banner Maker, which prints message banners on continuous-form computer paper. This offer is good through December.

Check Reader Service number 401.

"ARRRGGHHHH!"

LONDONDERRY, NH—The hundreds of thousands of games for home computers sold last Christmas should have produced thousands of frustrated computer adventurers by now, teetering on the edge of success, missing one vital clue. If you're one of these desperate C-64 gamers, Origin Systems (136 Harvey Rd., Bldg. B, Londonderry, NH 03053) has published *Quest for Clues*, a cluebook with solutions to 50 of the most popular computer text adventure and fantasy role-playing games. Many of the solutions found in the large-format, 192-page book are exclusive: No other solutions are available for these games. Included are over 80 detailed maps. All the major clues needed to solve these games are encoded to prevent you from spoiling your fun by accidentally reading more clues than you need. *Quest for Clues* is priced at $24.99.

Check Reader Service number 402.

LOOKING GOOD IN PRINT

CHAPEL HILL, NC—*Looking Good in Print: A Guide to Basic Design for Desktop Publishing*, a graphics design primer for desktop publishers, has been released by Ventana Press (PO Box 2468, Chapel Hill, NC 27515) for users who wish to design better-looking reports, advertisements, newsletters or other desktop-published printed material.

Neither hardware- nor software-specific, the 210-page book introduces the reader to the tools of the trade: white space, bullets, typefaces, rules, and more, and there are hundreds of invaluable tips and tricks for producing creative designs. A special discussion of ten common design pitfalls and how to avoid them can save hours of problem solving. The large-format softcover, with over 200 illustrations, is available for $23.95.

Check Reader Service number 403.

ANOTHER GEOS CONTEST

GRAND RAPIDS—Abacus (5370 52nd St., Grand Rapids, MI 49508), publisher of software and books for Commodore computers, has announced its GEOS/BeckerBasic contest to find the best GEOS applications to run on the C-64. The grand prize is $1000. Other prizes offer a variety of Abacus books and software. Entries must be submitted no later than August 31, 1988. Winning entries will be announced by October 31. For complete contest rules, see ad on p. 13 or the official entry form inside the BeckerBasic package.

BRITISH HUMOR

MOUNTAIN VIEW, CA—Activision (3885 Bohannon Drive, Menlo Park, CA 94025) is distributing London-based Rainbird Software's illustrated text adventure, Jinxter. Jinxter is set in modern-day Aquitania, a land that is normally saturated in luck and laughter and never burdened with accidents. You see, Aquitania is protected by a magical charm bracelet, a bracelet that limits the power of a secret masonic society of Green Witches.

As the story opens, you are heading home on a bus. Everyone's noticed that the general level of good fortune in Aquitania is going down, but few realize the reason. Little do they know that the Green Witches are gaining power and have been subverting society and turning fortune on its head, because the charms from the magic bracelet have been dispersed and there's no luck left. Your mission is to find and link together the seven charms of the bracelet and restore levity to the land of Aquitania. It's available for the C-64 for $34.95.

Check Reader Service number 404.

DESKTOP PUBLISHER

SAN MATEO, CA—PaperClip Publisher, a desktop publishing program for the C-64, lets you create brochures, resumes, greeting cards and newsletters in multiple-column page layouts. It supports various-size documents up to 50 pages in length. The program can work outside a document to temporarily hold text and graphics, and has a "refreshing" feature that automatically updates any altered part of a document. It also boasts WYSIWYG and has the ability to move articles from page to page. PaperClip Publisher is available for $49.95 from Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404.

Check Reader Service number 405.

A BRAND NEW CAR!

CHANDLER, AZ—Sharedata (7400 W. Detroit St., Suite 170, Chandler, AZ 85226) has released the C-64 version of Classic Concentration, based on the TV game show. You can compete against a friend or the computer as you try to match prizes on the board and uncover pieces of a hidden picture puzzle. Solve the puzzle before your opponent does to reach the final round and a chance to win the car of your dreams. It's available for $14.99.

Check Reader Service number 409.

IMPROVE YOUR CHANCES

MENTOR, OH—Auto Bingo, version 4.0, is a statistical word-scoring and processing program designed to help solve

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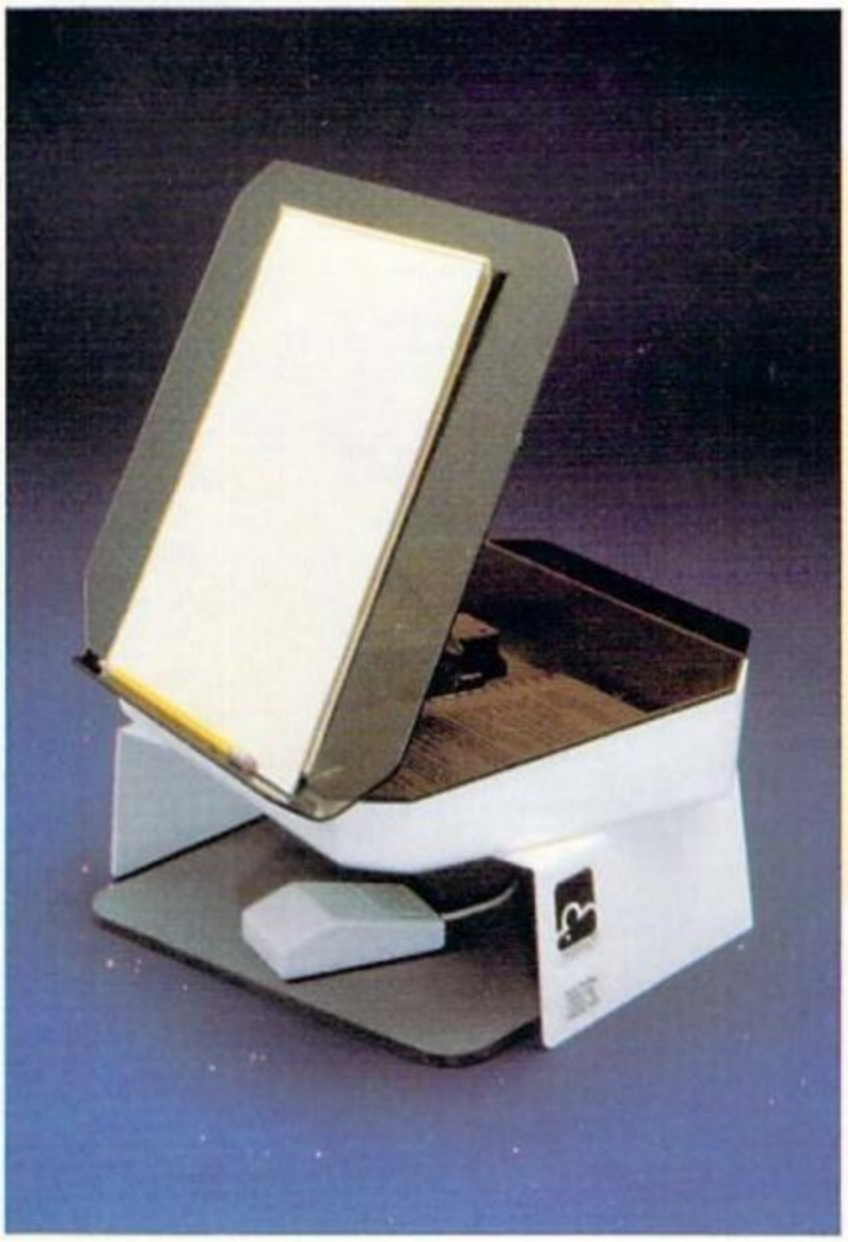
word-building and letter-value contest puzzles. The package comprises three programs. Playoff Solver ($48.95) is for use with the popular keywords Bingo and Bonus; List Creator ($67.95) produces a base of winning words custom-tailored to suit the requirements of any contest, and allows 1800 possible combinations of parameters for automatic scoring of the Dictionary disk; and Score/Analyze ($39.95) is used to enter, score, analyze and save your puzzle solutions or sponsor-supplied word lists. All three programs are offered for $137.95. They're available for the C-64 from Statgam, Dept. 130, 5668 Chagrin Drive, Mentor, OH 44060.

Check Reader Service number 406.

A Better Mousetrap

HILLSBORO, OR—Gered Corp. (2401 NE Cornell Rd., Suite 125, Hillsboro, OR 97124) has developed the Mousetrap for mouse-driven computer systems. The auxiliary workstation keeps your mouse and mouse pad in an enclosed, yet accessible, area, away from desktop clutter. The Mousetrap also includes a storage area to organize supplies and save desk space, and you can adjust the swivel stand to any position. It's available for $54.60.

Check Reader Service number 400.



When you reach for your mouse, you won't be digging through desktop clutter. The Mousetrap, from Gered, keeps your mouse and pad enclosed but accessible.

Tonegen & Porta-Pow'r-Pak

SIOUX FALLS, SD—Tonegen, a program for the home electronics technician, converts the C-64 into a signal generator. The package provides output level settings from zero to 15, monotone signaling, two-tone sequential toning, Motorola hookup and tone feature and 12-key DTMF. It sells for $12.95.

Porta-Pow'r-Pak is a power supply for the C-64 and runs from the 13.8-volt dc power source commonly found in cars, trucks, wheelchairs and golf carts. The company also includes full information for the conversion of the 1541 to operate from both 110 volts ac and 13.8 volts dc. The conversion requires only a switch, power connector, two diodes and three lengths of wire. The power pack is available for $79.95. Ludvigson Electronics, 415 N. Duluth, Sioux Falls, SD 57104.

Check Reader Service number 408.

New Word Processor For GEOS

CAMBRIDGE, MA—Better Working Word Publisher, a word processor for use with GEOS, has been released by Spinnaker (One Kendall Square, Cambridge, MA 02139). According to the company, this C-64 program can enter text five times faster than other GEOS word processors, can chain files for unlimited document size and can correct misspellings with its own 100,000-word checker. It's also compatible with geoPaint and geoFont. The price is $39.95.

Check Reader Service number 407.

News From Walt Disney World

LAKE BUENA VISTA, FL—Nearly one-third of Walt Disney World visitors have a home computer, according to the latest Epcot Poll.

The midwest has the greatest number of respondents (32%) who own a home computer. The other regions barely differ in the percent of computer owners. Of the number in the survey who said they had a home computer, 21% owned a Commodore. ■

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RUN's Reader Choice Awards Ballot

Readers, here's your chance to vote for your favorite Commodore software products. This ballot includes the most popular software categories, and you should vote for the product you consider tops in quality and performance in each category. Just place a check mark in the appropriate box or write in your choice on the line provided. Note: This is not a reader ownership survey. You don't have to own a product to vote for it, but you should be familiar with what it does and how well it works.

The rules of the voting are as follows:

► Vote for only one product per category. ► Only original ballots, not photocopies, will be recognized. ► Only one ballot per reader.
► Votes should be cast only for commercially available software, not public domain programs.
► Send your ballot, before July 25, 1988, to: *RUN* Software Contest, 80 Elm St., Peterborough, NH 03458
► Results of the voting will be published in the December 1988 issue of *RUN*. Thank you for your participation.

Entertainment

Arcade Adventures

5-1☐ Airborne Ranger (MicroProse)
2☐ Alternate Reality series (Datasoft)
3☐ Cauldron (Broderbund)
4☐ Defender of the Crown (Cinemaware)
5☐ Elite (Firebird)
6☐ Frankie Goes to Hollywood (Firebird)
7☐ Infiltrator series (Mindscape)
8☐ Moebius (Origin)
6-1☐ Pirates! (MicroProse)
2☐ Robot Rascals (Electronic Arts)
3☐ The Last Ninja (Activision)
4☐ The Movie Monster Game (Datasoft)
5☐ The Three Stooges (Cinemaware)
6☐ The Train (Accolade)
7☐ Other _____

Arcade Games

7-1☐ Archon (Electronic Arts)
2☐ Beach Head (Access)
3☐ Boulder Dash series (Electronic Arts)
4☐ Dan Dare (Electronic Arts)
5☐ Delta Patrol (Electronic Arts)
6☐ Fairlight (Mindscape)
7☐ GeeBee Air Rally (Activision)
8☐ Into the Eagle's Nest (Mindscape)
9☐ Marble Madness (Electronic Arts)
0☐ Rad Warrior (Epyx)
x☐ Skyfox II (Electronic Arts)
y☐ Other _____

Graphics Adventures

8-1☐ Accolade's Comics
2☐ Guild of Thieves (Firebird)
3☐ Maniac Mansion (Activision)
4☐ The Pawn (Firebird)
5☐ Other _____

Role-Playing Adventures

9-1☐ Alter Ego (Activision)
2☐ Bard's Tale series (Electronic Arts)
3☐ Beyond Zork (Infocom)
4☐ Mind Mirror (Electronic Arts)
5☐ Phantasie series (SSI)
6☐ Ultima series (Origin)
7☐ Wizard's Crown (SSI)
8☐ Other _____

Simulations

10-1☐ Apollo 18 (Accolade)
2☐ Chuck Yeager's Advanced Flight Trainer (Electronic Arts)
3☐ Echelon (Access)
4☐ Flight Simulator II (SubLogic)
5☐ Gunship (MicroProse)
6☐ Jet (SubLogic)
7☐ Project: Stealth Fighter (MicroProse)
11-1☐ Silent Service (MicroProse)
2☐ Stealth Mission (SubLogic)
3☐ Super Huey II (Cosmi)
4☐ Test Drive (Accolade)
5☐ Thunderchopper (ActionSoft)
6☐ Up Periscope! (ActionSoft)
7☐ Other _____

Sports Games

12-1☐ California Games (Epyx)
2☐ Championship Baseball (Activision)
3☐ Football (Software Simulations)
4☐ Hardball! (Accolade)
5☐ Indoor Sports (Mindscape)
6☐ LeaderBoard series (Access)
7☐ MicroLeague Baseball (MicroLeague Sports Assn.)
8☐ Pure-Stat Baseball (Software Simulations)
9☐ Superstar Ice Hockey (Mindscape)
0☐ 4th & Inches (Accolade)
x☐ 10th Frame (Access)
y☐ Other _____

Strategy Games

13-1☐ Battlefront (Electronic Arts)
2☐ Gulf Strike (Avalon Hill)
3☐ President Elect (SSI)
4☐ Rebel Charge at Chickamauga (SSI)
5☐ Roadwar 2000 (SSI)
6☐ The Sentry (Firebird)
7☐ Tracker (Firebird)
8☐ Other _____

Text Adventures

14-1☐ A Mind Forever Voyaging (Infocom)
2☐ Bureaucracy (Infocom)
3☐ Hitchhiker's Guide to the Galaxy (Infocom)
4☐ Hollywood Hijinx (Infocom)
5☐ Leather Goddesses of Phobos (Infocom)
6☐ Nord and Bert Couldn't Make Head or Tail of It (Infocom)
7☐ Plundered Hearts (Infocom)
8☐ Seastalker (Infocom)
9☐ Wishbringer (Infocom)
0☐ Zork trilogy (Infocom)
x☐ Other _____

Education

15-1☐ Bank Street School Filer & Databases (Sunburst)
2☐ Carmen Sandiego series (Broderbund)
3☐ Cave of the Word Wizard (Timeworks)
4☐ Chem Lab (Simon & Schuster)
5☐ Ladders to Learning (McGraw-Hill)
6☐ MacBeth (Avalon Hill)
7☐ Speed Reader series (Davidson)
8☐ Stickybear series (Weekly Reader)
16-1☐ Success with Math series (CBS)
2☐ Talking Teacher (Firebird)
3☐ Teddy Bear.rels of Fun (DLM)
4☐ The Accelerated Reader (Readup)
5☐ The Perfect College/Score (Mindscape)
6☐ Typing Tutor IV (Simon & Schuster)
7☐ Whole Brain Spelling (SubLogic)
8☐ Other _____

Productivity

Telecommunications

17-1☐ Bobsterm Pro (Progressive Peripherals)
2☐ Prototerm (Briwall)
3☐ Speedterm (Abacus)
4☐ Other _____

Databases

18-1☐ Data Manager (Timeworks)
2☐ Filer's Choice (Activision)
3☐ Fleet Filer (PSI)
4☐ geoFile (Berkeley Softworks)
5☐ Pocket Filer 2 (Digital Solutions)
6☐ Superbase (Progressive Peripherals)
7☐ Other _____

Desktop/Tabletop Publishing

19-1☐ Color Mail (Hallmark)
2☐ Create with Garfield (DLM)
3☐ geoPublish (Berkeley Softworks)
4☐ Hi-Tech Expressions series
5☐ Newsroom (Springboard)
6☐ Outrageous Pages (Electronic Arts)
7☐ PaperClip Publisher (Electronic Arts)
8☐ Personal Newsletter (Softsync)
9☐ PrintMaster (Unison World)
0☐ The Print Shop (Broderbund)
x☐ Other _____

Graphics (Drawing)

20-1☐ The Advanced OCP Art Studio (Firebird)
2☐ CAD 3-D (IHT)
3☐ CAD PAK 128 (Abacus)
4☐ Color Me (Mindscape)
5☐ Doodle! (City Software)
6☐ Flexidraw (Inkwell)
7☐ Home Designer 128 (Briwall)
8☐ KoalaPainter (Koala)
9☐ Other _____

Integrated Software

21-1☐ Fleet System (PSI)
2☐ GEOS (Berkeley Softworks)
3☐ Personal Choice series (Activision)
4☐ Pocket series (Digital Solutions)
5☐ Vizastar 128/Vizawrite 128 (Progressive Peripherals)
6☐ Other _____

Spreadsheets

22-1☐ geoCalc (Berkeley Softworks)
2☐ Multiplan (Epyx)
3☐ Planner's Choice (Activision)
4☐ Pocket Planner 2 (Digital Solutions)
5☐ Swiftcalc (Timeworks)
6☐ Vizastar 128 (Progressive Peripherals)
7☐ Other _____

Word Processing

23-1☐ Fleet System IV (PSI)
2☐ FontMaster 128 (Xetec)
3☐ geoWrite Workshop 128 (Berkeley Softworks)
4☐ PaperClip III (Electronic Arts)
5☐ Pocket Writer 2 (Digital Solutions)
6☐ Superscript 128 (Progressive Peripherals)
7☐ The Write Stuff (Busy Bee)
8☐ VizaWrite 128 (Progressive Peripherals)
9☐ Writer's Choice (Activision)
0☐ Other _____

Utility

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24-1☐ Blowup (DSI)
2☐ Fast Load Cartridge (Epyx)
3☐ Final Cartridge series (H&P Computers)
4☐ JiffyDOS/64 (Creative Micro Designs)
5☐ Mach 5/Mach 128 (Access)
6☐ Partner 64 (Timeworks)
7☐ Quackdas (CDA)
8☐ Quick Brown Box (Brown Boxes)
9☐ RapiDOS (Chip Level Designs)
0☐ Super Snapshot (Software Support Int.)
x☐ Warp Speed (Cinemaware)
y☐ Other _____

Programming Aids

25-1☐ Basic 8 (Patech Software)
2☐ Basic 64/128 (Abacus)
3☐ Blitz! 64/128 (Skyles)
4☐ C-128 Assembler Development System (Commodore)
5☐ geoProgrammer (Berkeley Softworks)
6☐ Merlin (Roger Wagner)
7☐ The Better Working Power Assembler (Spinnaker)
8☐ The Better Working Programmer's Tool Box (Spinnaker)
9☐ Other _____

Utility Programs

26-1☐ Big Blue Reader (S.O.G.W.A.P.)
2☐ Billboard Maker (Solutions Unlimited)
3☐ Graphics Integrator 2 (Inkwell)
4☐ The Graphics Transformer (CDA)
5☐ 1581 Utilities (Free Spirit)
6☐ Other _____

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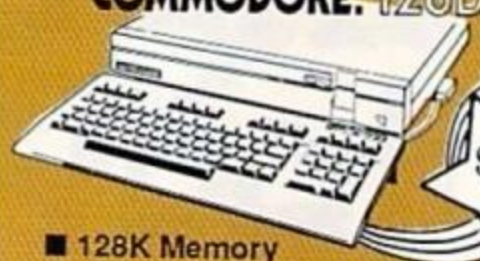

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MAIL RUN

Readers reveal their good and bad experiences with products and companies.

MICRO DETECTIVE REVIEW

In response to your Micro Detective review in the April Software Gallery, I'm working to improve the clarity of the manual and I've lowered the program's price to $39.95. Also, the review didn't mention some important features of the program. First, Micro Detective automatically lists the line in a Basic program where an error has occurred, then highlights the faulty statement and, if possible, the particular item that's wrong (number, character, string, or the like). The Find and Change commands also use highlighting.

Second, there was no mention of Micro Detective's unusual ability to list variables, help, and so forth, while the Basic program is running. Third, the C-128 version supports both the 40-column and 80-column screens, showing the error trace on one while your program runs on the other. Finally, Trace commands can be conditional, as in TRACE 100-500: TRACE PRINT, READ: WHEN X = 4: UNTIL X*X = Y.

—BENNETT COOKSON, JR.
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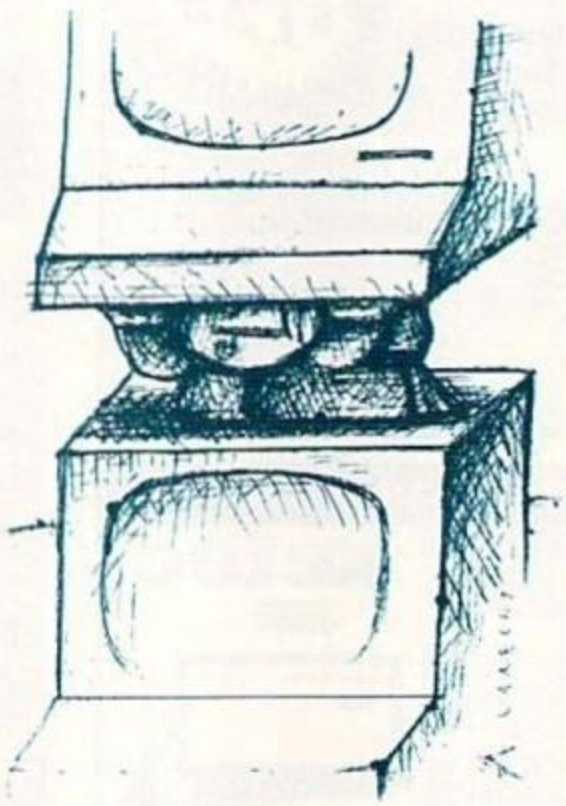
PLUSES AND MINUSES

In his article on naval simulations in the February issue, Bob Guerra said that "gamers who demand realism and historical accuracy. . .will want to set sail with Up Periscope!." If he means Silent Service doesn't have those qualities, he should do more homework. Being an avid reader of military literature, plus the owner of both programs, I consider Silent Service far better historically, as well as in realism and playability. I also don't think Destroyer is as good as he thinks it is.

—TIMOTHY L. SMITH
GREENSBORO, NC

I'd like to share some thoughts on databases I've tried. I was very disappointed with Timeworks' Data Manager 128 and returned the software to the retailer almost immediately. I also wrote to Timeworks, and their reply was a form letter that totally ignored my comments. When someone recommended Progressive Peripherals' Superbase to me, I probably would have purchased it, only I got zero response from a reader service card and decided so much for customer support.



Fleet System 4, from Professional Software, is a beautiful package as long as your interest is primarily word processing or a simple database. Its major shortfall is the six-line limitation on the printer. Commodore's database, JaneFile, is just as easy to use and has a superior printer routine. It's not protected, either.

I finally bought Digital Solutions' Pocket System and am very pleased with it. However, the awkwardness of the instructions is a problem. After many frustrating hours, I got Pocket Filer performing beyond my expectations and will shortly move to a 1750 and 1581, as writing to disk 2 takes too long, and sequential files seem to swallow disk blocks whole.

GeoFile appears to have real potential, and I'm glad it recognizes that there's a 40/80 display key on the C-128. Everyone else, except Jane, expects you to go to 64 mode for 40 columns—and Jane is 40-column only. The odds are that, because I love 40-column's ease on the eyes and the C-128's capabilities, I'll buy geoFile next.

—RALPH W. NESTLER
LAKE WALES, FL

When I bought Pocket Writer from Digital Solutions, the program wouldn't load, so I sent it back. They returned it to me as "okay," but still no luck, so I gave up and bought another product. Then I read a letter in last January's Mail RUN indicating I must shield the hardware to get the program to work. If Digital Solutions is that paranoid about its products, I can do without them!

—A. D. WILSON
MARIETTA, GA

A while back, I received a Datasoft game with a "buy one, get one free" offer in the box—free for $4.95, that is. I collected the required nonsense (original receipt, picture from the box, coupon from the box), wrote a check and sent it all off. My mailing was promptly returned with a cryptic remark, "This offer has expired." According to the blurb in the package, it still had six weeks to run. A couple of years ago, I got the same runaround on a similar offer from Epyx. This isn't the way to win friends and influence people!

On the plus side, I may never understand Patech's Basic 8, but I can appreciate the genius and work that went into developing such an innovative package.

—MARY WILSON
CLEARWATER, FL

After reading "Mail Order Maxims" in the May 1987 *RUN*, I ordered products from four different companies, and have had trouble dealing with them all. Micro Computer Services and Computer Direct both sent me the wrong software. When I contacted them, they said I'd receive the correct order 48 hours after returning what they had ►

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2400's are great (but quite expensive). Most users can't justify the cost difference unless they do a large amount of modem work with a service that can handle 2400 baud.

You will also notice a few very cheap 1200s on the market at "too good to be true prices." They are. The reason is that they are usually foreign built and not truly Hayes® and Commodore 1670® compatible therefore not usable in all situations and with all serivces.

What is Hayes® compatibility? It's the industry standard and about all modem manufacturers have adopted the "AT" (Hayes) command set. Virtually all software being written now uses Hayes commands. Beware of those who don't.

Let's compare Minimodem-C™ with the 1670®

Comparison of	Minimodem-C™ vs.	1670® vs.	Avatex
Hayes® Compatibility?	100%	Subset Only	Subset Only
Commodore direct Connect?	Yes	Yes	No
Number of Status Indicators	7	0	8
Busy Detect?	Yes	No	No
DTR Signal Support?	Yes	No	Yes
High Speed Detect Line?	Yes	No	No
Number of DIP Switches	8	3	8
Number of Status Registers	16	3	?
Guarantee	1 yr.	90 days	?

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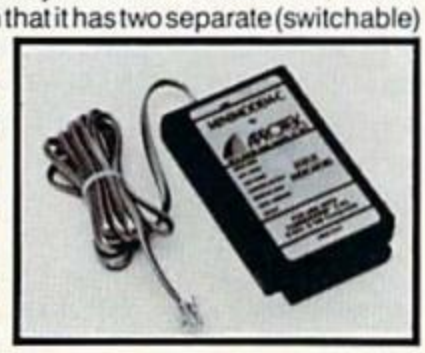

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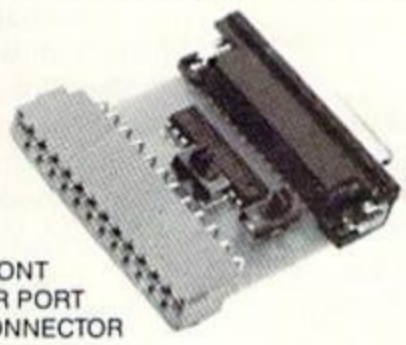

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sent. In both cases, it was weeks before I finally got the correct software.

I also purchased a disk drive from Pro-Tech-Tronics, after being told over the phone that I had a "15-day free trial." The drive was faulty, and I returned it within 15 days, but my "full" refund check consisted of only the price of the disk drive, not the $20 postage and handling. Then the refund check bounced when I cashed it, because the company had filed for bankruptcy. I still haven't been reimbursed by them.

Finally, I ordered a program from Great American Software, which was claiming a 15-day free trial in a sale brochure. When I received the program, a letter enclosed in the package stated that I'd receive a refund of my money less a $10 restocking fee if I were dissatisfied.

I've learned not to buy by mail unless absolutely necessary, and then to be very careful!

—MARK RIESSELMAN
MANILLA, IA

"Mail Order Maxims" gave guidelines that should minimize trouble, but problems can still arise, and it looks like you've had more than your share. Now you should refer back to the article for advice on dealing with companies that have gone into bankruptcy. Also, since Pro-Tech-Tronics has been a RUN *advertiser, our Customer Service Representative will see if she can help.*

—EDITORS

When I purchased Video Title Shop, I couldn't handle the program, so I wrote to Datasoft. They sent additional instructions that didn't help, so I gave up. My guess is, the program wasn't tested enough before it was brought to the market.

—GERTRUDE BERTING
NEW YORK, NY

Last year, I ordered a copy of the Epyx Sub Battle Simulator preview disk, which was supposed to be delivered within two months. Four months later, I was given a 30-day extension. When I finally received the product, the disk jacket was mangled from the small mailer and the documentation was inadequate.

In the meantime, I received a letter from Frank Nunez in Portland, Oregon, advertising fantastic software for $5 per disk, plus $1 shipping and handling. I couldn't refuse and ordered two disks, which arrived in one week. Later, I found out from *RUN* that the software was copyrighted and being sold illegally.

Who are the good guys and who are the bad guys here? The legal products took nine months to arrive and were unsatisfactory; the illegal ones came in one week and in good shape!

—MICHAEL ROSS
LYNCHBURG, VA

I must say that I like PrintMaster Plus, which lets me preview my work at any time, and I think the graphics in Art Gallery 1 are rather good. However, when I load posters I've saved with PM, a giftbox always appears in the center, with my graphic pushed into a corner. As I don't really need these old posters, it doesn't matter, but other readers might like to know.

—DAVID PEACOCK
FLEETWOOD, LANCASHIRE
ENGLAND

Fleet System 4 is an outstanding program, but I had trouble setting up a printer driver to use it with my Okidata 180, and, being stationed overseas, I couldn't phone for help. However, Professional Software answered my written questions in detail with rapid turnaround correspondence.

—FREDERICK O. SMITH
FPO, NEW YORK

RESTLESS RESTON

When I purchased "Adding Power to Your Commodore," from Reston Publishing, I didn't get the disk that goes with the book. I tried writing to Reston, but they're no longer at the given address. Do you know how I can contact them or otherwise get a copy of the disk?

—LEE A. SIMON
111 GREENTREE DRIVE
LAFAYETTE, LA 70508

Reston has become part of Simon & Schuster, Route 9W, Englewood Cliffs, NJ 07632; 201-592-2000. When we contacted them, we were told "Adding Power to Your Commodore" is no longer available. Perhaps another RUN *reader has the disk and would be willing to part with it.*

—EDITORS

KEEPING A BRANCH ALIVE

I read your "All in the Family Tree" article on genealogy programs last December and then Peggy Martin Perkins' letter about it in April's Mail RUN. Like her, I was surprised that Personal Ancestral File, a fine program from the Church of Jesus Christ of Latter Day Saints (Mormons), wasn't mentioned. If, as you replied in April, the Church is discontinuing the CP/M version of PAF, perhaps they'd release it into the public domain. Could you publish their address, so that I and other interested C-128 users could write and make that suggestion?

—ED DESOTO
REMBERT, SC

Sounds like a great idea! Our PAF contact was Lance Jacob, Ancestral File Operations Unit, 50 East North Temple St., Salt Lake City, UT 84150.

—EDITORS

RUFFLED FEATHERS

As a subscriber to your fine magazine and a patriotic Pennsylvanian, I'd like to point out an error in your March issue. In line 1590 of the Affairs of State program, on page 87, Ruffled Grouse should be Ruffed Grouse. Our state birds do not wear ruffles, nor are they discombobulated!

—TERRY L. SASSAMAN
READING, PA

MAIL-IN USER'S GROUPS

The Commodore Mail-In Users Group answers questions for C-64 and C-128 owners who have problems choosing software, using third-party equipment or writing programs. We charge 40 cents to help beginners, 65 cents to answer information questions and 90 cents for programming help. Please send a SASE with your request. We also encourage people to pass our answers along. In fact, on request, we'll send two or three copies.

—COMMODORE MAIL-IN
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553 EAST FULTON ST.
LONG BEACH, NY 11561-2416

I'm starting a mail-in club for Commodore users. There will be a frequent newsletter and eventually a BBS.

—MICHELE ALEXANDER
517 CENTER PLACE
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A CALL TO READERS

This page is your stage, so stand up and say a few words. Extend praise, air grievances or offer hands-on advice and information. Send your letters to Mail RUN, 80 Elm St., Peterborough, NH 03458. Each letter must include the writer's name and complete address. RUN *reserves the right to edit letters for style, clarity and space.* ■

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Partner 128		39
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Swiftcalc 64		17
TAS 128		42
TAS 64		29
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Neofont	19
Word Publisher (GEOS)	28

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3D Perspective 2		39
Advanced OCP Art Studio		25
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BASIC 3		25
Billboard Maker		29
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Cadpak 128		42
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SOFTWARE GALLERY

July fireworks include a screen enhancement, a nuclear accident re-enactment and practice on the putting green.

Compiled by BETH S. JALA

CHERNOBYL ..... B+

How Calm Can You Remain Under Crisis?

I was living outside of London, England, in April 1986 when the Chernobyl nuclear power plant, 80 miles north of the Soviet city of Kiev, exploded, spewing substantial amounts of deadly cesium, krypton and xenon into the atmosphere. The resulting fallout eventually circled major portions of the globe in amounts ranging from small to lethal.

I can still remember British newscasts showing English farmers dumping contaminated milk and slaughtering livestock because of the unsafe iodine levels generated by that fallout. I can also recall the resulting fear and panic, and the demonstrations that crowded European streets for weeks afterwards. So, it was with a growing sense of forboding that I opened Cosmi's program, Chernobyl—The Nuclear Power Plant Simulation.

Chernobyl is not a game. It's a very complex computer simulation concerned with running a full-scale nuclear power plant. If you're looking for fun and games, look elsewhere. If, on the other hand, you're seeking a program that tests your ability to examine and analyze data, and act on given situations as interpreted from the program's guidelines, then Chernobyl may be for you.

Chernobyl turns your C-64 into an operations monitor for a modern nuclear power plant. You, as the operator on duty, have a wide range of responsibilities. Not only must you bring the plant online and monitor power output to the main grid, you must also troubleshoot operational problems. Predicaments facing you can be anything from low pressure levels to a full-scale core meltdown.

While monitoring the station's status and the dozens of gauges, switches, plant layouts, and core and control rod diagrams might seem like an overwhelming task at first, the computer won't let you fizzle unaided. Possible trouble areas and hiccups in the system are brought to your attention well before they can become real problems. Through input to the computer, you must somehow correct the various faults. The documentation only offers general guidelines on how to handle certain situations, so you must rely on how well you have grasped the theory of plant design and operation, and how each system affects the other. That is the most difficult aspect of interacting with this compelling simulation.

Chernobyl comes with two fascinating pieces of documentation. One is The Chernobyl Story, which gives you the background of the Soviet disaster and its consequences. The second booklet details the theory of nuclear generation and power plant design. Although I've never considered myself interested in the subject before, I found the reading extremely absorbing. I talked to the author at length, thinking that surely someone in the nuclear power industry had collaborated on the writing. Interestingly enough, the author did all the research and development himself, and so thoroughly, in fact, that you'll feel as though you've taken a college course on the subject by the time you've mastered this program.

Sadly, if there's one aspect lacking in Chernobyl, it's the portion of the documentation that deals with the running of the power plant. Theory is fine until it comes time to actually close a valve or insert the control rods. Chernobyl has a Manual command that brings the program instructions to the screen or prints them out, which I suggest you do. While the instructions tell you what command words perform each function, it doesn't fully explain how to use them. The consequence of this is that you'll spend several hours with Chernobyl before you have the slightest idea of what you're doing around the plant.

The documentation also fails to inform you that, in order to scroll around the plant, a joystick must be plugged into port #2. I happened to discover this option by sheer trial and error after wondering where the scenes were that I'd seen on the reverse side of the Chernobyl packaging!

While the emphasis of the program is on strategy and data analysis, the graphics are snappy and effective. The nicer displays include a dissected diagram of the nuclear core and a scrolling schematic layout of the power plant. Sound effects range from the dull hum of the plant generators, to the teeth-grinding whine of the warning alarms and buzz- ►

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A Superb!
An exceptional program that outshines all others.

B Good.
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ers, which you will hear many times throughout your shift.

Chernobyl is not for everyone. You'll either love or hate this program, with no middle ground. It is difficult to "play" and you have to do your homework to succeed. But the first time you successfully manage the plant without blowing it to bits, you may find yourself skipping gleefully around the room. *(Cosmi, 415 N. Figueroa St., Wilmington, CA 90744. C-64/$24.95.)*

—JOHN RYAN
BILOXI, MS

DEMON STALKERS ..... B+

Move Through Miles
Of Mazes to Reach
The Evil Entity

Why is it that the villains in so many dungeon games always have weird names like Mangar or Nequam? I suppose there would be little incentive to battle your way through several dungeon levels just to waste someone called Tim or Lou. In Demon Stalkers, the evil one is Calvrak, an entity that the game's manual describes as "vicious, hideously evil and remarkably ugly."

Before you get to see just how bad Calvrak is, however, you'll have to fight your way down through 100 dungeon mazes inhabited by rats, mad mages, ghosts, dervishes and snappers. Each monster poses a unique threat—dervishes steal your possessions, mages throw fireballs, and so forth—and all can be deadly. Fortunately, your on-screen adventurer comes armed with a crossbow and an unlimited supply of arrows. If you feel you need some help, a two-player cooperation option lets you bring a friend along.

Additional assistance is provided in the form of clue scrolls left during a previous expedition. Before advancing to certain levels, you're given a chance to boost your character's health points by correctly answering questions concerning that quest. Some dungeon levels can only be entered after typing the correct password—which you can find by using the Magical Cypher, a rotating wheel decoder that works exactly like Legacy of the Ancients' Galactic Museum Access Ring.

Although Demon Stalkers has a lot in common with games like Legacy of the Ancients, Bard's Tale and even the Ultima series, it's primarily an action game. You are presented with a scrolling bird's-eye view of each dungeon level showing your on-screen adventurer and his immediate surroundings. Although there are some puzzles that must be solved and occasional tasks that must be completed in order to advance to lower dungeon levels, the emphasis here is on action and quick reflexes rather than logic and strategy.

In Demon Stalkers, your character can survive only as long as he has health points remaining. Health points that are depleted in battle can be restored by finding and eating a variety of foods ranging from bread and water to entire banquets. In addition, strength, armor and magical ability can be enhanced throughout the game by finding specific relics like helmets, shields and wands. Other items that you'll find during your quest include scrolls, amulets, bells, chests and keys. You must, however, watch out for poison food, slow death curses in the form of scrolls, amulets that paralyze the user, and bells that temporarily enrage all the monsters on your current dungeon level.

When you've finally run out of dungeon levels to conquer, you can create your own levels by using the built-in construction set. This icon-based game editor lets you customize every aspect of the dungeons, from the placement of walls and objects to the color and pattern of the floors. This option promises to keep the game fresh long after you've vanquished old What's-His-Name! *(Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. C-64/$29.95.)*

—BOB GUERRA
SOUTH BOSTON, MA

MINI-PUTT ..... B

Are You Up For
A Mini-Round
Of Golf?

Have you ever wanted to play a quick round of computer golf without having to worry about which club to use on each hole or the speed and direction of the wind? Then grab your favorite putter/joystick and try a round of Mini-Putt.

You and up to three other golfers can sharpen those putting skills on four nine-hole miniature golf courses: a Classic course featuring the famous windmill hole, a Traditional course, a Deluxe course, and for advanced mini-putters, a Challenge course. Mini-Putt also features a practice mode that lets you perfect your putting on any of the game's 36 holes.

Shots are lined up by moving a cross-shaped cursor to the position where you want the ball to go. Three carefully timed presses of the joystick button set the power and accuracy of your stroke and put the ball in motion. Like other golf games, Mini-Putt uses moving power and accuracy bars to determine the strength and angle of your shot. The bars move slowly enough for even young players to putt fairly accurately after a small amount of practice.

As you play, the upper portion of the screen provides a large overhead view of your current position on the hole, while the lower section displays a smaller, bird's-eye view of the entire hole. Every hole covers from one to four screens, and each has a par of three or less.

I think that the Classic course is the most enjoyable. Some of its holes feature colorful structures that you can putt through—a castle, space shuttle or miniature Taj Mahal—while others require you to use precise timing to move the golf ball past an animated obstacle. For example, you must time your putt to roll through a swinging gate, an airplane's rotating propeller, an elephant's trunk and a swinging log. On one hole, the only way to sink the putt is by hitting the ball into the barrel of a cannon. When you do, the cannon automatically fires the golf ball over a wall and directly into the hole.

Mini-Putt's three other courses are all fun to play, but none features the interesting obstacles or playful animation used in the Classic course. The Traditional, Deluxe and Challenge courses rely on maze-like walls and patches of arrows that affect the movement and direction of the ball.

Although Mini-Putt does a good job of bringing the fun of miniature golf to the computer screen, those three courses could be a lot more interesting with just a little of the imagination that was put into the Classic course. Nevertheless, it's a game that all members of the family can play and enjoy. *(Accolade, Inc., 550 South Winchester Blvd., Suite 200, San Jose, CA 95128. C-64/$29.95.)*

—BOB GUERRA
SOUTH BOSTON, MA

SOKO-BAN ..... B

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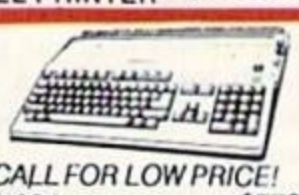

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ing. Pac-Man, of course, is the most famous example. Now Spectrum HoloByte has released a C-64 version of Soko-Ban, a Japanese best seller that also uses mazes as its primary feature. However, this program does not include among its intended audience those who only relish frenzied arcade action.

Designed for either joystick or keyboard control, Soko-Ban has as its "hero" a warehouse foreman. Using as few moves as possible, he must transport—only by pushing and not pulling—every crate in one of 50 preprogrammed storage areas to marked destination slots.

The game's challenge is to assure that when it is time to move a particular box through the twisted aisles, there is not only an opening at the location it is going to, but also another space on the opposite side for the warehouseman to stand in. These openings won't exist if other crates have been unwisely positioned earlier in the session.

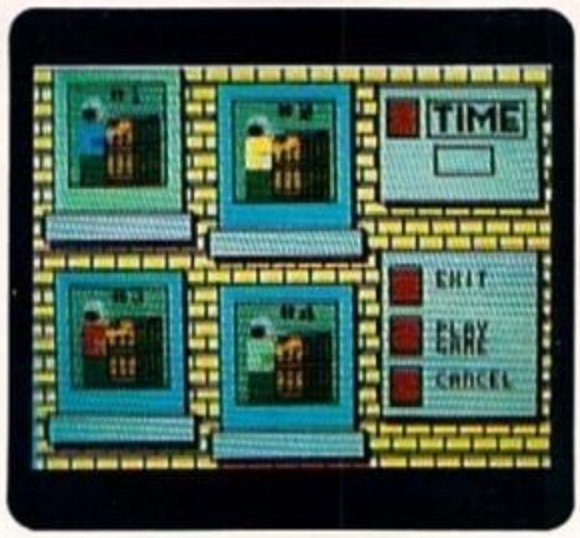
Unfortunately, the game's documentation is confusing at times. Nonetheless, someone who reads the software's manual and reference card while experimenting with what appears on the screen should quickly learn the mechanisms of play.

The program boasts a number of features that are far more successful than the instructions. In addition to the standard one-person play, it offers a tournament option for up to four participants. In it, the winner is the competitor who most effectively and efficiently moves the boxes.

There is also a user-friendly construction option that allows for the creation of 49 individualized screens. In addition, the program can save one tournament and one solitaire game, and it automatically records the three highest scores for each of the 99 levels. Also, the disk is not copy protected, so backup copies can easily be made.

The graphics, animation and sound effects are well done, though rather simple. Unfortunately, there can be noticeable lulls as these game elements are brought to the screen. However, in some cases, a fast-loader can reduce these pauses by more than 50 percent.

Although the program's positive features far outweigh its drawbacks, it is definitely not for everyone. Its relatively static on-screen activity will bore most fast-action enthusiasts. In fact, because it requires planning five or more moves in advance, it will appeal less to Pac-Man fans than to chess players. However, in their own way, such intellectual gamesters might possibly embrace



You are the honorable warehouseman in Soko-Ban.

Soko-Ban with as much fervor as any arcade addict ever felt for the world-famous dot gobbler. *(Spectrum Holobyte, 2061 Challenger Drive, Alameda, CA 94501. C-64/$24.95.)*

—WALT LATOCHA
OAK PARK, IL

SCREEN F/X ..... B–

Animate Your Screen With Exciting Video Combinations!

This slide presentation and screen designer program is so unusual that it's difficult to give it only one grade. Even the title—pronounced Screen EFF-ECKS, a take-off on the screen effects used in movies—is a little out of the ordinary.

The software helps you make superb visual effects for your programs' introductory screens, and, coupled with a VCR and connectors, it also produces professional-looking title screens for video tapes. Screen F/X can help you design teaching aids, advertising screens and slide shows. And because it has a stand-alone program that lets others see your creation, it can be used to send greeting cards via computer disk.

In this capacity, Screen F/X deserves an A+. A friend of mine who does extensive programming on the C-64 said, "By using Screen F/X, I can get an effect in a few minutes that would take me half an hour using Peeks and Pokes."

With Screen F/X, you can load a hires or multicolor screen and make it dissolve bit by bit into another screen; push text and pictures around on the screen; make text dance like a snake; scroll text from bottom to top like movie credits; or slide text lines together from the left and right sides of the screen. You can make the text, background or border flash; "wipe" letters and pictures away; open windows; draw shadowed boxes; or fill backgrounds. There's a demo on the disk that is sure to leave you drooling at the possibilities.

Although it takes patience to learn, Screen F/X is the ideal program for people who want to design professional-looking program screens. But it will also quench the thirst of less serious computerists who yearn for a slick program that can take Doodle! pictures (or others in similar formats) and put them in a slide show, move them around, fade one into another or slide them across the screen.

However, the big desert between the user and the oasis is Screen F/X's documention. The casual computer user will find it difficult to understand. An advanced user who helped me evaluate Screen F/X said he made more progress with the program when he booted it up and played with it—before he read the 58-page manual. Although Screen F/X works wonders with the monitor screen, the documentation rates a C–.

There is one walk-through in the manual that illustrates how to load and run a script already on the disk. Then, the manual's example shows how to change the script slightly and run it again. There are some other demonstrations on the disk that you can use to see how the program works.

While the walk-through and demos are helpful, the manual would be more useful if it contained specific examples of how to work the various aspects of Screen F/X. It would be nice to be able to turn to a page and see how to flip a picture vertically, for instance, or to see a script on how to move one picture off the screen while moving another on.

There's no way—or at least none is mentioned in the instructions—to add sound effects to Screen F/X, nor do the instructions say how, if indeed you can at all, mix sprites with the program. It also doesn't appear that a screen created with Screen F/X can be used in a Basic program.

When running, the program depends heavily on disk operations. It has a fast-load feature and can be used with up to four disk drives. But even with a rapid loader installed, the action-intense screens can take 20 or 30 seconds to load. That seems long to a computer user watching a clever title screen.

Screen F/X can be likened to a bicycle: It takes dedication and serious study to master, yet the end result is its own reward. Like a bicycle, F/X can expand ►

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SPRUCING UP YOUR DOCUMENTS

Find the spacing and duplication errors that spelling checkers don't identify in your computer-generated documents.

By WALTER LATOCHA

IF AN IMPORTANT DOCUMENT is to impress its readers, it obviously must be as free of errors as possible. A spelling checker can aid greatly in accomplishing this goal, but most of them will not indicate where there are either too few or too many spaces, nor will they discover duplicate words or punctuation marks.

The directions below describe how you can add checks for such mistakes to your computer's repertoire. The only requirement is a word processor that can search for a group of characters that begins or ends with a space or a punctuation mark. Most word processors for Commodores can do this.

The directions are specific only for certain errors, but, using them as a guide, you can develop additional checks, tailor-made for your particular documents.

Some software firms are beginning to realize that searches for spacing and duplication errors *should* be incorporated into commercial word processing and spelling checker software. Simon & Schuster, for example, has included a detector for duplicate words in its Webster's New World Spelling Checker for the Apple II series of computers. However, until such features become common in packaged programs, you *can* do it yourself.

General Directions

Access the search function of your word processing program, and enter the character sequences listed below. The slashes merely indicate separations between the letters and symbols in the sequences, so *don't* type them in. "Space" means to press the space bar once. Where uppercase and lowercase versions of the letters in the sequences are possible, be sure to search for both.

It's quite possible that these procedures will turn up "errors" that are actually quite correct. If this happens, just pass over them and continue the search for real errors.

The character sequences below will locate many, but not all, spacing and duplication mistakes. If you wish, you can easily add other checks. For example, you could search for errors involving exclamation points by substituting exclamation points for periods in the sequences.

Note that the checks on spacing are based on standard business-typing practice—two spaces after a period at the end of a sentence, one space after a comma, and so forth.

Shortcuts for some of the searches are mentioned in the footnotes.

Checking for Too Few Spaces

/./A/ **/./B/** and so forth through the alphabet.[1]

/./space/A/ **/./space/B/** and so forth through the alphabet.[1]

/,/a/ **/,/b/** and so forth through the alphabet.[1]

/a/(/ **/b/(/** and so forth through the alphabet.[2]

Checking for Too Many Spaces

/a/space/space/ **/b/space/space/** and so forth through the alphabet.[2]

/./space/space/space/

/,/space/space/

/space/./

/space/,/

Finding Common Duplications

/././

/,/,/

/space/a/space/a/space/

/space/the/space/the/space/

1.—These sequences look for the first letter of a word following a space or punctuation mark. Since more than half of all English words begin with a, o, s, t or w, you can check for just these five letters instead of the entire alphabet if time is at a premium. This won't catch all of your spacing errors, but it should find most of them.

2.—These sequences look for the last letter of a word preceding a punctuation mark or space. Since more than half of all English words *end* with d, e, s or t, you can save some time by checking for just these four letters instead of the entire alphabet. ■

Walter Latocha is an auditor by profession and a freelance writer on computers, VCRs and electronic games.

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your speed and range considerably.

The next analogy is obvious: Expect many a tumble before you ride away unscathed into a glorious screen display. *(Solutions Unlimited, PO Box 177, Dobbs Ferry, NY 10522. C-64/$34.95.)*

—LONNIE BROWN
LAKELAND, FL

COMMANDO ..... C–

Another Bang-Bang, Shoot-'Em-Up Conversion

Far be it from me to criticize a company that has built a good reputation on producing quality entertainment software by converting arcade hits into home computer titles.

So I won't say that Commando is one arcade game that Data East should have left alone. I will say that it isn't nearly as good as other enjoyable conversions from the same company like Karate Champ, Kung Fu Master and Express Raider.

Commando doesn't measure up to those efforts partly because it isn't well suited for home play and partly because Data East didn't add a v features that could have changed th fact.

The object of the g me is summed up in two sentences on the single sheet of instructions: "As the cr shot, Commando, your mission is move forward into enemy territo You must destroy the enemy and it e by passing through the Iron Wal..

Using a joystick to maneuver across a top-to-bottom scrolling battlefield, you dodge bullets, hand grenades, vehicles and other obstacles. You can use trees or other objects for cover while trying to wipe out enemy troops and emplacements.

Points are earned on the basis of how many adversaries you destroy and how far you advance behind enemy lines. Bonus points can be earned by rescuing prisoners and destroying enemy leaders and headquarters.

It takes a lot of skill to get past the first section of enemy-held territory before losing all five lives with which you begin each game. The trouble is that getting through the territory requires only a minimum amount of strategy, but a maximum amount of quick reflexes and good eye-hand coordination.

Your commando starts each game with a limited supply of grenades, but an almost endless supply of bullets. The "bad guys" are everywhere, so it's crazy not to keep firing away while trying to move deeper into enemy grounds.

That feeling adds to the frustration of trying to conquer this game. Unless you're a superstar at shoot-'em-ups, you'll frequently find yourself running out of lives before progressing much further than the last time you played. And when you run out of lives, you must start back at the beginning.

Commando lacks an option to let you pick up the next game where the previous one left off. Another feature that's missing is the ability to record top scores permanently to disk. The game tracks the best scores during continuous-play sessions, but those scores are lost forever once the computer is shut off.

In Commando, it's just you and your weapons against the enemy forces.

I don't think it's asking too much to expect a home adaptation of an arcade game to have features like the above. It's nice not to have to keep feeding a machine with quarters, but a game with the furious action of Commando could have incorporated features to make it less tedious and more enjoyable. *(Data East USA, Inc., 470 Needles Drive, San Jose, CA 95112. C-64/$19.95.)*

—SCOTT WASSER
WILKES-BARRE, PA

BORDER ZONE ..... C+

I Spy, You Spy, We All Spy!

Perhaps you shouldn't have watched *Murder on the Orient Express* so often. It's making this otherwise peaceful train trip seem spooky. You even dreamed that a spy broke into your compartment and handed you an important document. He'd been shot, but he left before you could ask any questions. Now there's blood on the carpet, and that piece of paper you're holding looks very sinister!

So begins Border Zone, a text adventure that departs from the Infocom norm with a number of innovations.

There are three central characters in Border Zone: an innocent businessman, a young American spy and a ruthless KGB agent. As they are intertwined in an assassination plot, you get the opportunity to play from all three points of view. The successful completion of each of three parts of the game throws you into a continuation of the drama as a different character. It's an interesting concept and one that works relatively well.

You're the businessman in part one, and you must figure out a way to deliver the document to your contact despite the fact that you don't know who your contact is; and there are KGB agents and police crawling all over the place! In part two, you're the American spy, trapped behind the border and trying to keep from freezing to death while avoiding the border guards, dogs, searchlights and various other traps. In part three, as the KGB agent, you have to stop the assassination attempt without revealing the fact that you're a double agent.

Unfortunately, one of the new features of Border Zone is responsible for the game being much less interesting than it might have been. This is real-time, where the clock is always running, even when you pause the game and stop the action. The game has some very clever puzzles that, without the real-time pressure, could've been expanded upon to make them more challenging and interesting.

It comes down to a matter of frantically searching for the right move to make until you get killed, and then restoring a saved position and going on to the next puzzle. All three games are actually quite short; once you've figured out the moves, the three scenarios can be played in about 30 minutes.

The clock in this game runs at two different speeds—fast and slow—and you can change the speed in each section. The faster time is meant to challenge expert players. However, even though I consider myself an expert player, in part three, I found it impossible to perform the required actions in the time given.

Infocom once again features online Invisiclues in Border Zone. Invisiclues can be both a blessing and a burden. On the one hand, you are never frustrated by being completely stuck on a puzzle for days. On the other hand, it

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takes considerable willpower not to run for a hint every time you're stuck.

The standards at Infocom are such that it's virtually impossible for them to put out a bad game, but I hope that the real-time experiment was just that. The very features that make Infocom such a powerhouse in the interactive fiction field seem to have suffered a bit in Border Zone. *(Infocom, Inc., 125 Cambridgepark Drive, Cambridge, MA 02140. C-64/$34.95.)*

—ART LEWIS KIMBALL
TUSCOLA, IL

PROJECT: SPACE STATION . . B

Can You Lift Off And Stay On Budget At the Same Time?

Moon landings, space walks and shuttle launches—the exciting, "fun stuff" portrayed in computer games—represent only a small part of space exploration. What about the nuts and bolts

Weather conditions—just one aspect of the knowledge you'll need to run Project: Space Station.

of planning, research and personnel selection, to say nothing of scheduling and budgets? All these and more become your responsibilities as you direct Project: Space Station.

The Project is intended as an ongoing mission that can occupy as much leisure time as you care to invest. With a pair of reusable shuttles to move people and materials, repeated cycles of planning, launching, extra-vehicle activities (EVA) and landing get the station you design up and ready to perform useful, income-generating research and development tasks. Your aim throughout is to upgrade station capabilities, expand research and development, and, keeping one eye glued to the bottom line, eventually show a profit!

Reflecting an overriding concern with realism, everything from station modules and equipment to salaries and use of NASA facilities is accounted for in budgeting. Time really is money here. Whether or not schedules are met, most project areas continue expenditures, so "cutting a little slack" usually means cutting someone a hefty check. The same applies to deciding what goes up—or comes down—and when. Even with an Auto Load program to help, passenger and cargo space is decidedly limited, and, of course, there's no such thing as a free launch.

The project director employs several colorful worksheet screens to aid in making decisions. When purchasing laboratory, crew, power and other station modules, or buying equipment like research packs, space suits, construction pods and satellite boosters, you are shown each item, its price and given access to in-depth descriptions. A station-design display lets you experiment with module placement, while animated landing and EVA hands-on control sequences supply welcome action relief. Other displays take care of shuttle scheduling, loading assignments and the actual launches.

To help you zero in on "the right stuff" in critical R & D and personnel areas, separate screens list the 40 proposed projects and 32 mission candidates. For the latter, you have immediate access to dossiers documenting skills and even personality traits—important information, since you want to minimize worker conflicts. Similarly, you can call up R & D project summaries to get some idea of payoffs versus costs in personnel and equipment.

Predictably, as a complex simulation, Project: Space Station is a slow starter. An excellent on-disk tutorial and some predeveloped missions are very helpful. However, the manual, loaded with typos and lacking illustrations, barely qualifies as adequate. For example, most essential data is available only on-screen, so you must supply readable hardcopy via note-taking. By way of compensation, you'll find good organization, speedy response and realistic attention to detail.

Definitely not for space-war types, Project: Space Station is long-playing entertainment aimed squarely at the builder and the dreamer. *(Avantage/Accolade, 550 South Winchester Blvd., Suite 200, San Jose, CA 95128. C-64/$14.95.)*

—JEFF HURLBURT
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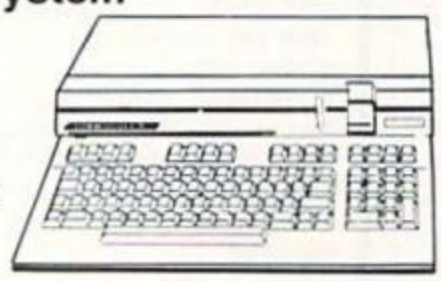

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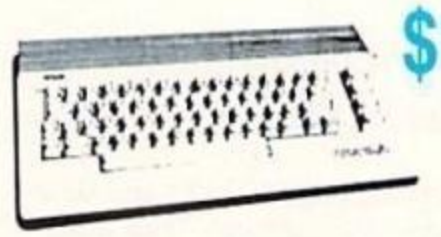

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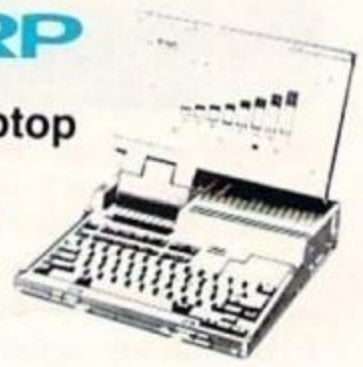

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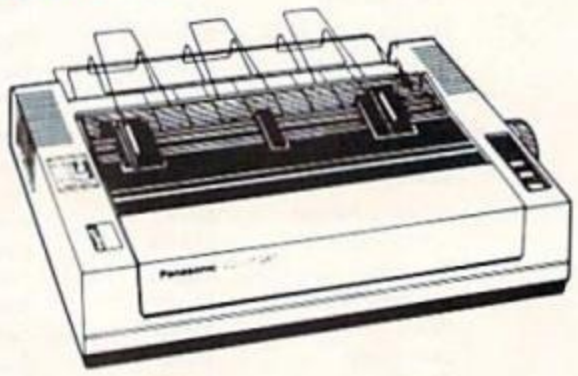

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Graphics GALORE

When it comes to graphics, your Commodore is in the big leagues. This software lineup shows why.

FROM THE START, the C-64 has been considered a graphics computer. With its 16 colors, 320 × 200 graphics resolution and eight sprites, it far outshone the Apple, Atari and IBM computers of its time, and even though there are now superior graphics computers available, the C-64 and C-128 still offer the most graphics power for the lowest cost.

There are three major categories of graphics programs available for your Commodore: painting, drawing and computer-aided design (CAD). While these types share some basic features, they differ in the way they generate computer images, and they provide different kinds of tools for you to use. The programs within each category come with a variety of features and prices.

Graphics programs are often considered tools for serious artists, and, as you'll see, several of the packages I survey here do qualify as such. However, you don't have to be an artist with a capital A to use and enjoy them. For children, they can be sophisticated coloring books, programmers can use them to generate art for their programs and the rest of us can use them for self-expression or just plain fun.

Paint Programs

The most common type of graphics application is the paint program. Paint programs for the C-64 and C-128 generally operate in Multicolor mode, where you can use all 16 of the computer's colors at once, and up to four within a color cell. Whereas a cell in Hi-Res mode measures 8 × 8 pixels (dots), each cell in Multicolor mode is only four pixels wide by eight high, since each pixel is twice as wide as in Hi-Res mode. This decreases the horizontal resolution in Multicolor mode to 160 pixels per line, compared to 320 in Hi-Res. Even though it's generally desirable to use the highest possible resolution, sometimes the flexibility offered by Multicolor mode's extended color features is more important. So it is with computer painting programs.

One of the earliest C-64 paint programs was **KoalaPainter**. Used with the KoalaPad (and later the Koala lightpen), it gave us our first look at just how good computer paint programs could be on the C-64. It was so popular that its file format for storing pictures on disk became a standard of sorts for Multicolor-mode pictures. Even though Koala products are no longer being made, you may be able to find them on dealer shelves or advertised in user's group newsletters. While now somewhat dated, KoalaPainter remains an excellent entry-level C-64 graphics package.

In 1985, Polarware introduced **The Graphics Magician**, another multicolor C-64 paint package. This program supports joysticks and the KoalaPad for input and provides a modest as- ►

By LOU WALLACE

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Perhaps the finest C-64 paint package available in the U.S. is The Advanced OCP Art Studio.

sortment of features, including lines, circles, boxes, area-fill and eight brushes (patterns) with which to draw and paint. It also lets you add text to your pictures.

The Graphics Magician is particularly interesting in that it saves pictures not as bit-map data, but as lists of instructions. This approach makes the disk files very small, allowing more pictures per disk. However, the files are non-standard, so you won't be able to use them with other programs. The Graphics Magician was originally written for the Apple II computer and, in my opinion, doesn't really take advantage of the special features of the C-64.

Next we come to Springboard's **Rainbow Painter**, a multicolor C-64 paint program designed for children of ages four and up. It, too, is an early program (1984) with a minimal list of drawing tools (including lines, circles, boxes, mirroring and area-fill). However, its impressive palette lets you mix foreground and background colors to create many more than the computer's 16 colors, and there's a wide selection of 50 predrawn brushes.

Rainbow Painter is controlled with a joystick, the keyboard or a KoalaPad. Its easy-to-understand menu offers ten categories of predrawn black-and-white pictures that can be used like a coloring book, and the colored-in pictures can be saved to disk, printed out and erased to be recolored later. The menu also offers two freehand drawing modes: a regular one and one that creates mirror images with various orientations.

Rainbow Painter is a reasonable coloring book program for children. Its main drawbacks are slow load times on the 1541 drive (correctable with a fast-load cartridge) and the lack of support for the 1351 mouse, an accessory I've found that children use readily. These limitations are due, of course, to the fact that the program was released several years ago. The relatively slow speed of the joystick is also a small flaw.

Mindscape puts out a children's paint program for the C-64 called **ColorMe**. Released in 1985, but still available, this is a three-disk package, with the program on one disk and predrawn images on the other two. It supports both joysticks and the KoalaPad, and, like Rainbow Painter, it can be used as a simple coloring book. However, its painting features go beyond those of Rainbow Painter, offering a good cut-and-paste feature for copying one area of the screen to another. The menu bar at the top of the screen is done in the now-traditional icon style, with pictures and words explaining the choices.

ColorMe provides only four brushes, the usual 16 colors and just a few drawing tools beyond freehand and area-fill. A set of real crayons and some blank buttons, computer paper and envelopes come in the package. In general, this is a good children's program, except, once again, for slow disk access and lack of mouse support.

Blazing Paddles, a C-64 program from Baudville, brings us to a more sophisticated level of paint software. As the name implies, this multicolor paint program supports paddle controllers for drawing, but you can also use a lightpen, KoalaPad, joystick or trackball, making Blazing Paddles the winner in the input-device category. Like the other programs I've mentioned so far, this one doesn't support the 1351 mouse, because it was written too early.

Blazing Paddles offers all the fundamental paint-program tools, plus a few extras. The list includes dots, lines, boxes (outline and solid), circles (again, outline and solid), seven brushes, airbrush, freehand, zoom (to enlarge areas for detail editing), text with multiple fonts, area-fill and cut-and-paste. You can use the C-64's colors as is, or "mix" them to get many more, and the program comes with a library of predrawn shapes (clip art) you can paste into your pictures.

I consider Blazing Paddles a competent entry-level painting program, but no more than that, because the tool set barely goes beyond the minimum for a serious package. Its big plus is its support of a variety of input devices. If you want to paint with a trackball or game paddles, this program is the only choice you have.

One paint system for the C-64 I haven't seen, but have heard great things about, is **Artist 64**, from Wigmore House in London. It evidently offers the C-64 user the type of drawing power usually found only in Amiga paint programs. Besides hundreds of combinations of drawing tools, it provides color cycling and stencil capabilities, can record and play back drawing sessions, lets you pick up an area of the screen to use as a brush and (can you believe it!) supports a mouse.

Perhaps the finest C-64 paint package available in the United States is **The Advanced OCP Art Studio**, a British product that's part of Activision's Firebird line. Without a doubt, this is a professional-level computer paint system. It uses a mouse (unfortunately, not the 1351), the KoalaPad or a joystick with a system of pull-down menus that work in much the same way as those on the Amiga and Macintosh.

The Art Studio tool set is extensive. Beyond

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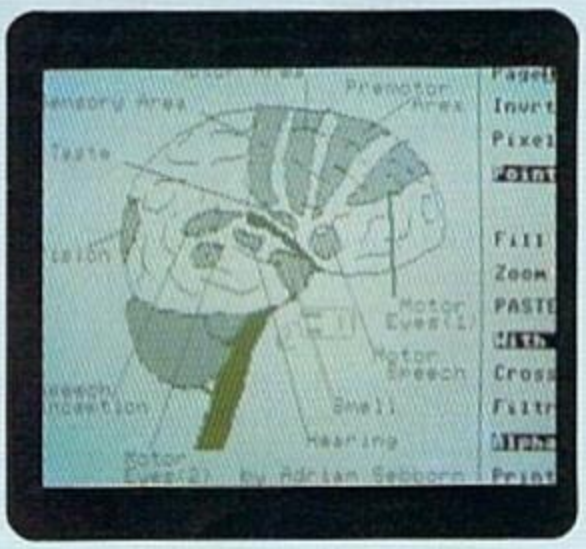
With ColorMe, your child can load and color in the image of a "Rainbow Brite" kid.

The Advanced OCP Art Studio's multicolor screen shows pop-down menus.



An example of a hi-res drawing done with Flexidraw 5.5.

An on-screen menu from the CAD program, Home Designer.

those I've already mentioned for other programs, it provides continuous lines, rectangles, triangles, rays, elastic lines, multiple pen and brush shapes, patterned area-fills and eight types of airspray patterns. The Zoom mode is unusual in offering three levels of enlargement. Text support includes a variety of sizes, bold and italic, bidirectional printing and a built-in editor for creating your own character fonts.

The OCP Art Studio also has a superb cut-and-paste feature that lets you duplicate, rotate, flip, mirror, enlarge, reduce and even (shades of the Amiga!) stretch rectangular areas of the screen you've copied to a buffer. These areas can also be saved to a disk library for use in other pictures.

The printing capabilities of this program are impressive, letting you vary the print density and the X and Y scaling of the printout, center or justify the image on the paper and even rotate it 90 degrees for sideways printing. Still more impressive is the Configuration option for customizing the printer driver to your printer by stipulating escape sequences, the number of wires on the printhead, linefeed specifications, and more. This almost ensures that Art Studio will work with your dot matrix printer.

There's a lot more in this package, but I think you get the idea: Art Studio is a great program. I highly recommend it for both the serious artist and those who are serious about having fun with their computer paint systems.

Drawing Programs

For the purposes of this article, I'll define a computer drawing program as one that operates in the 320×200 Hi-Res mode of the C-64 or C-128. Like Multicolor mode, Hi-Res mode lets you use all 16 of the computer's colors at once. However, each color cell can accommodate only two colors, and the cells are eight pixels wide as well as high. You'll find that using color is somewhat more difficult in Hi-Res than in Multicolor mode and that colors are more likely to bleed (spill over into adjacent areas). While Hi-Res mode can be used for painting, it's more appropriate for drawing, where resolution is more important than color.

To start our look at Commodore drawing programs, I'll continue with **The OCP Art Studio** from Firebird/Activision. In addition to the multicolor paint program, this package includes a complete hi-res drawing program on a separate ►

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Commodore users have an impressive array of graphics software to choose from.

disk! The programs are similar in use, so once you're familiar with one, you'll be at ease with the other. The Art Studio drawing program is excellent in just about every way.

Doodle!, for the C-64, is an early drawing program that has stood the test of time, still being sold after several years. It's been used so extensively, in fact, that, like KoalaPainter, its picture format has become an informal standard, this time for hi-res pictures. The program is controlled with a joystick, and it offers all the standard drawing tools. Doodle! is a good selection for an entry-level drawing program.

A drawing program for both the C-64 and C-128 that has become popular lately is **geoPaint**, one of the applications packaged with Berkeley Softworks' GEOS. GeoPaint comes with a standard tool set (lines, circles, boxes, text), plus some extra features, such as high-quality fonts, support of Commodore's RAMDOS (for owners of the 1700 series of RAM expansion cartridges) and a very large virtual canvas (640 × 800), only part of which appears on the screen at one time. It's controlled with a joystick or the 1351 mouse, and the C-128 version can use the 80-column screen, for a full 640-pixel-wide monochrome display. As another plus, you can transfer geoPaint-generated art to other GEOS applications, such as the geoWrite word processor.

Flexidraw version 5.5, from Inkwell Systems, is an excellent C-64 drawing program that supports lightpens, the KoalaPad, joysticks and the 1351 mouse, and lets you work on a virtual screen of 640 × 400 pixels. Its extensive toolset includes boxes, circles, ellipses, arcs, zoom, area-fill (patterned and solid), lines in three widths, freehand, airbrush, and more. You can also create shaded patterns and edges, as well as cut and paste images, mirroring, rotating and flipping them in the process. The package includes several sets of symbols (math, schematic, clip art and architectural) that you can cut out and paste into your drawings; and text is well supported, with nine regular-size fonts and four larger "flexi" fonts. Additional fonts are available in a separate Inkwell package called Flexifont.

Flexidraw doesn't directly support color. Instead, you must save your picture and exit the program, then access another program on the disk called Pen Palette. Additional programs on the disk include a terminal program for transmitting your pictures to other users, a copy program for backing up the master disk and a preference manager for indicating the printer you'll be using.

Flexidraw is worthy of your serious consideration. Keep in mind that, while the program has been around for a while, Inkwell has constantly updated it, and I expect their support will continue.

Computer-Aided Design

Computer-aided design, or CAD, programs differ from other graphics software mainly in the way they define screen images. Painting and drawing programs create images through bitmapping, in which each pixel on the screen is assigned its own bit (location) in memory. CAD defines them mathematically, making it possible to create realistic representations of objects, and then to enlarge, rotate, reduce, move and edit them without loss of resolution. C-64/C-128 CAD software is well suited to architectural design, where you can plan anything from home-built furniture or a dog house for Rover to that new home for your family you've always wanted to build.

CAD-3D, from IHT Software, is unusual in letting you create three-dimensional representations and then rotate them around any of the three spatial axes. This C-64 program works in both Multicolor mode, where you can have three different colors per object, and in Hi-Res mode, which restricts you to a single color.

The screen display area is 256 × 192 pixels, with a status line at the bottom, and while the resolution of the display is limited, internally the program supports a three-dimensional grid of 256 × 256 × 256 user-defined units. CAD-3D lets you build complex images from as many as 2000 individual lines, and it supports both the Commodore 1520 plotter and dot matrix printers. If you've ever wanted to try your hand at three-dimensional graphics design, the opportunity is at hand with CAD-3D—and its price is relatively low.

If you're a C-128 user interested in two-dimensional CAD design, you should check out **Home Designer** from Briwall Software. This 40-column program is extremely sophisticated, offering features normally found only in packages for more expensive computers. If you're an electronics or architectural designer, you'll appreciate its ability to represent up to five layers in a drawing, with each layer containing up to 400 lines, 100 circles and 100 text strings. That makes for quite a complex drawing when all layers are used.

Home Designer also offers about a dozen drawing commands, including insert, delete, rotate, translate, trim, divide, mirror, change and zoom

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Table 1. Distributors and prices.

The Advanced OCP Art Studio
Activision
3885 Bohannon Drive
Menlo Park, CA 94025
415-329-0800
C-64, $39.95

Artist 64
Wigmore House
32 Savile Row
London W1X 1AG
England
C-64

Blazing Paddles
Baudville
5380 52nd St., SE
Grand Rapids, MI 49508
616-698-0888
C-64, $34.95

CADPAK
Abacus Software
5370 52nd St., SE
Grand Rapids, MI 49508
616-698-0330
C-64, $39.95; C-128, $59.95

CAD-3D
IHT Software
2269 Chestnut St. #162
San Francisco, CA 94123
415-923-1081
C-64, $49.95

ColorMe
Mindscape
3444 Dundee Rd.
Northbrook, IL 60062
312-480-7667
C-64, $34.95

Doodle!
Crystal Rose Software
109 S. Los Robles
Pasadena, CA 91107
818-795-6664
C-64, $39.95

Flexidraw 5.5
Inkwell Systems
5710 Ruffin Rd.
San Diego, CA 92123-1013
619-268-8792
C-64, $34.95

GEOS, including geoPaint
Berkeley Softworks
2150 Shattuck Ave.
Berkeley, CA 94704
415-644-0883
C-64, $59.95; C-128, $69.95

The Graphics Magician
Polarware/Penguin Software
PO Box 311
Geneva, IL 60134
312-232-1984
C-64, $24.95

Home Designer
Briwall
PO Box 129
Kutztown, PA 19530
800-638-5757
C-128, $45

KoalaPainter
C-64
No longer in production; check stores and used-merchandise ads.

Rainbow Painter
Springboard Software
7808 Creekridge Circle
Minneapolis, MN 55435
612-944-3915
C-64, $34.95

(enlarge). There are also commands for loading and saving data and viewing the disk directory. With the program's "housekeeping" commands, you can repaint (refresh) your screen display, include or exclude layers, view the status of the layers and available memory resources, and create library modules. Home Designer's commands are selected with a joystick, mouse or the keyboard.

The manual with the program is quite good, with every command defined and explained. It also contains a reasonably good tutorial and ten appendices that explain the program's many special features in depth. Given the quality of the manual and the power of the program, I consider Home Designer the best CAD program available for the C-128.

Abacus Software publishes **CADPAK**, a 40-column C-64 and C-128 program that supports the keyboard, a lightpen and the 1351 mouse, which surprisingly is a little harder to use than the lightpen. This program has user-definable units and works on a virtual screen of 640 × 360 pixels. Its many commands, which are activated by positioning the cursor and pressing the mouse or lightpen button, let you set points, lines and boxes; draw diamonds, circles, ellipses, arcs and other curves; center images; and fill areas of the screen. Your drawings can also contain text in various sizes and three styles: Old English, 3D and Tech.

CADPAK's other features include Zoom mode, for working in fine detail; Measure mode, which tells the distance between two points; Copy, for duplicating one area in another; and a host of editing features. You can also define up to 104 objects to keep in memory, then place them anywhere you wish in a choice of sizes. The manual is quite extensive and comes with a tutorial. All around, CADPAK is a powerful program.

As you can see, Commodore users have an impressive variety of graphics software to choose from, and, since the C-64 and C-128 have been around for several years, it's had a chance to evolve to where it's competitive with programs written for more expensive machines. With programs like these available, you needn't spend a lot of money to create sophisticated and exciting graphics! ■

Lou Wallace, RUN's technical manager, is also co-developer of Basic 8, a popular, full-featured 80-Column drawing program for the C-128.

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P·I·X·E·L

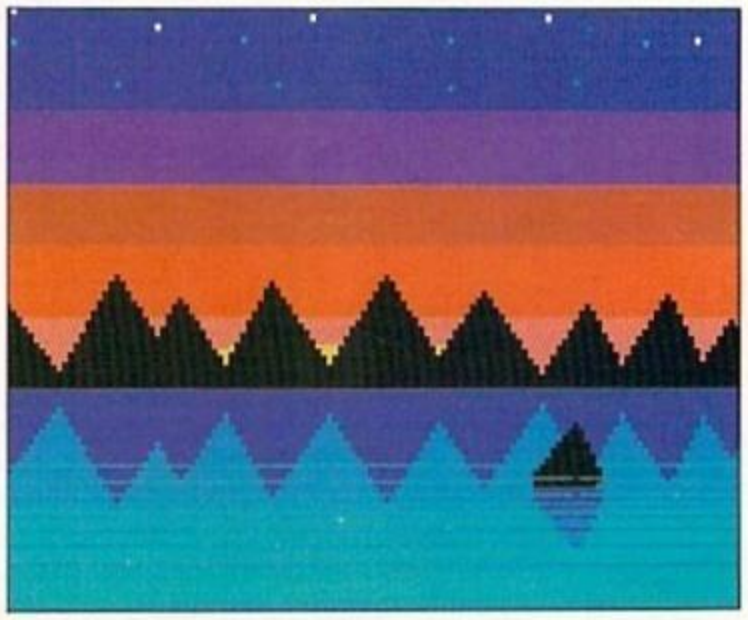
CREATING ARTWORK WITH A COMPUTER offers enjoyment and satisfaction. As I've witnessed the evolution of computer graphics programs, I've also seen an increase in the number of computer artists, all developing their ideas in unique ways.

·Wayne Schmitt·

Perhaps the most famous C-64 artist of all is Wayne Schmitt. Schmitt lives in New York City and has used a C-64 since 1983 to create graphics images that have won wide acclaim. Like some of the other artists mentioned here, his favorite multicolor graphics package is Artist 64, from England's Wigmore House, although he also enjoys using Flexidraw, The Advanced OCP Art Studio and Doodle!. A few of his images can be found on the Commodore 1581 test demo disk.

·Wayne Lorentz·

If you're a QuantumLink user, the chances are that you're familiar with the work of Wayne Lorentz. Lorentz, who lives in Highland Lakes, New Jersey, and is pursuing a B.A. in computer graphics, has been creating drawings on his C-64 since 1983. He's probably best known for the colorful, detailed screens he's done for Q-Link, including the Rock Link and Bonnie's Bar title screens. For graphics programs, he favors KoalaPainter, Doodle! and The Advanced OCP Art Studio.



·Joe Ekaitis·

QuantumLink fans are also sure to recognize Joe Ekaitis's work. A resident of Loma Linda, California, Ekaitis is best known for his cartoons featuring "The Fox," which have been on Q-Link since September of 1987. Prior to that, he uploaded his cartoons to CompuServe. Ekaitis has been dabbling with artwork on the C-64 since 1984, and his two favorite graphics packages are KoalaPainter and The Advanced OCP Art Studio.

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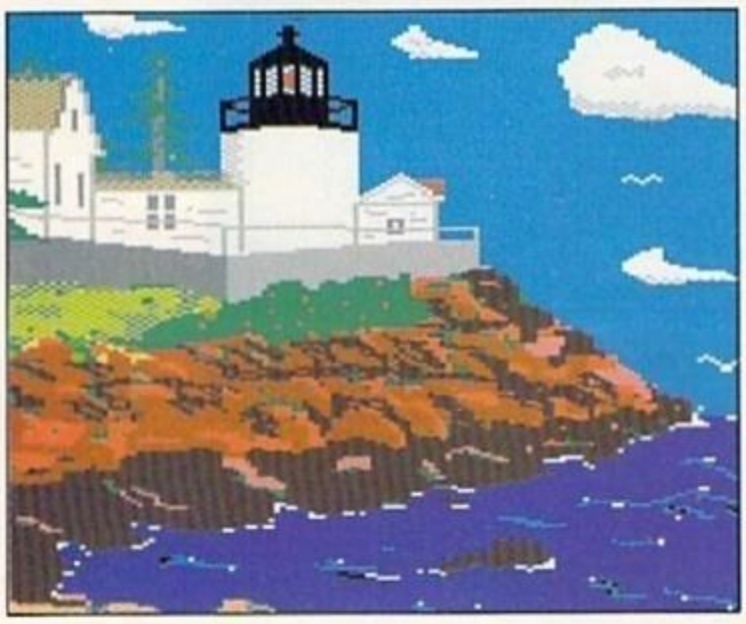
P·E·R·F·E·C·T·I·O·N

I've gathered the work of a handful of talented artists who have earned varying degrees of public recognition for their computer-generated creations. I hope their pictures inspire others to try their hands at computer artwork. BY TIM WALSH

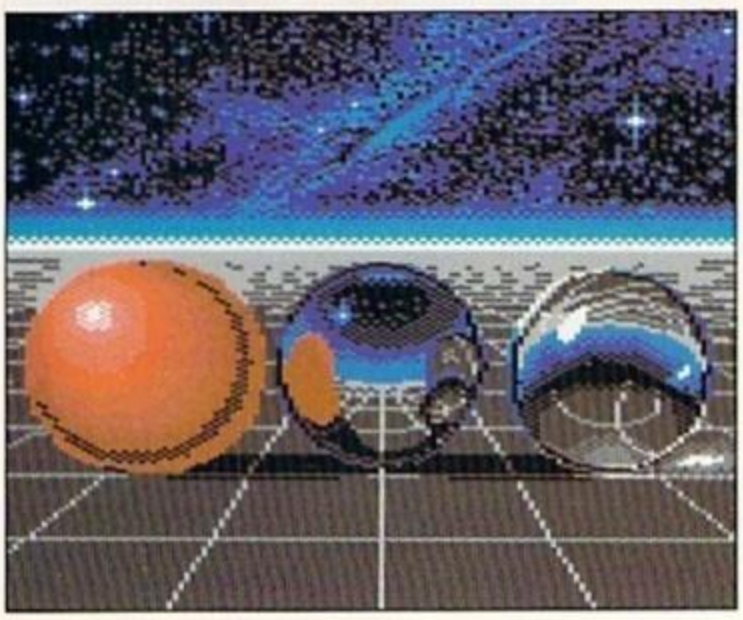


MICHAEL MANZER

Michael Manzer, a 49-year-old electrician from Orange, California, submitted some C-64 artwork to *RUN* that instantly caught the attention of the entire editorial staff. Manzer spends his summer vacations on the Maine seacoast, where he produces renditions of lighthouses that are second to none. His work is created exclusively on a KoalaPad, using a KoalaPainter cartridge.

PAUL & PETER HUGHES

Identical twins Paul and Peter Hughes reside in Canton, Massachusetts. As non-stop cheerleaders for the Commodore 8-bit computers, the Hughes brothers are fixtures at computer shows all over North America. Paul, sysop PH to you QuantumLink habitués, keeps tabs on Commodore computer artists. While his most popular work is found in commercial graphics packages, such as Inkwell's Flexidraw, he remains active in creating artwork of his own. Artist 64 is his favorite graphics package for the C-64.



JAMES HASTINGS-TREW

As a resident of Saskatoon, Saskatchewan, James Hastings-Trew is the only Canadian in this round-up of artists. I get the impression that if he'd never been exposed to computers, this gifted artist would probably be busy with canvas and oils. Fortunately, Hastings-Trew has spent the last four years creating beautiful C-64 art—finely detailed work that's both dynamic and eye-catching. Artist 64 is his graphics program of choice. ■

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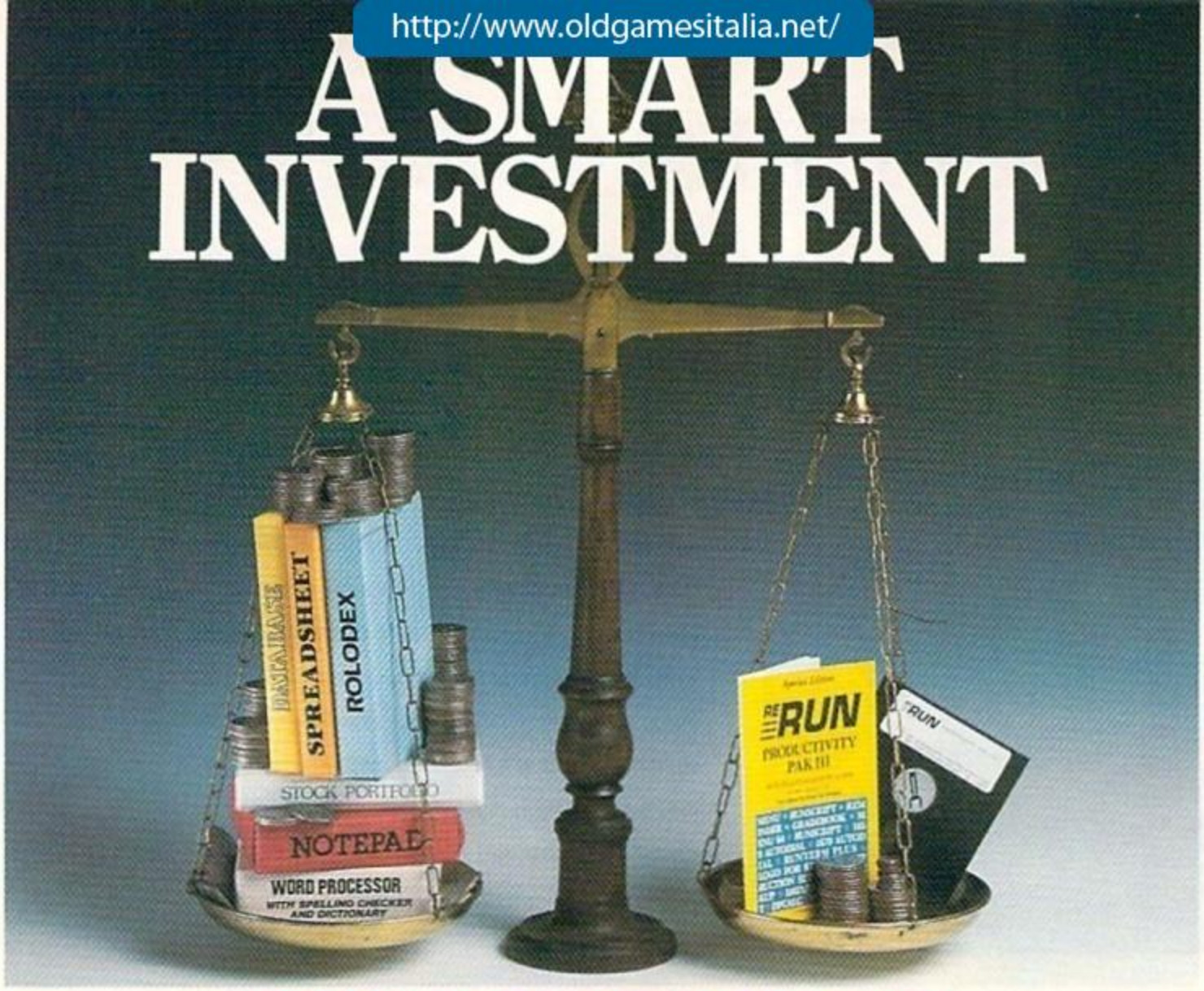
A SMART INVESTMENT



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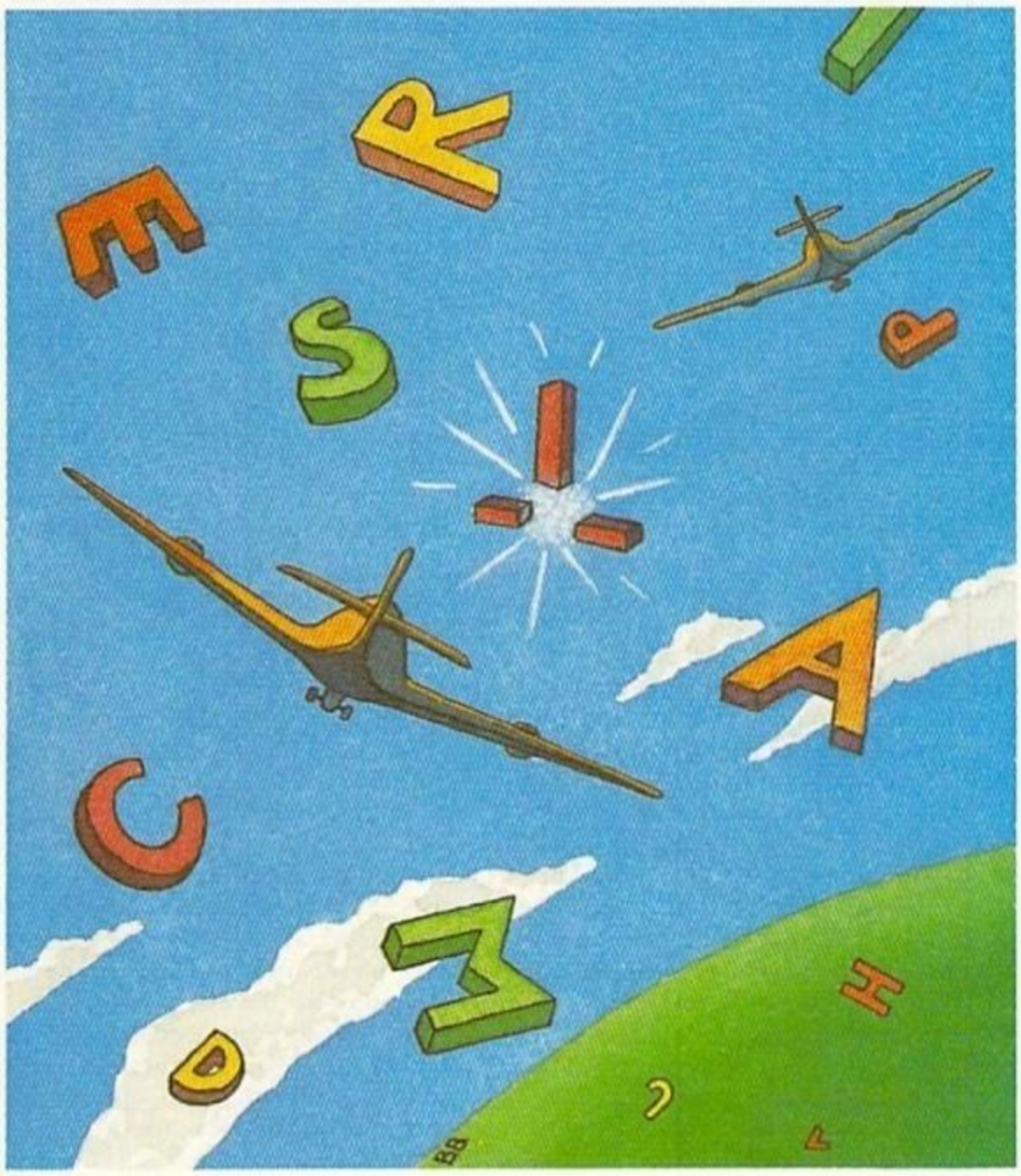
Alphabet Cadet

Quick! Shoot that falling letter to match the target word, or your opponent will get it first!

By JOHN RYAN



Alphabet Cadet is a vocabulary game that's so exciting the whole family will want to get involved. A one- or two-player game, it offers a high level of challenge and competition, with features including a scrolling playfield, sound effects, two levels of difficulty and full score-keeping, including high score.

The idea of the game is to shoot down letters that match those in a randomly selected word as an assortment of letters scrolls down from the top of the screen. While this may sound easy, competition for the letters is keen, because your opponent—either computer or human—is striving for the same letters you are. Level 2 offers an added twist: If a player shoots a letter that both players possess, the opponent will lose it from his score and must shoot for it again.

The first player to match the target word wins the round. Alphabet Cadet is programmed for five rounds of play, with 15 target words, but these defaults can be changed.

Set-Up

Most of the program is written in machine language, so you must complete a couple of steps before play can start. First, type in and save Listing 1 to disk under any filename, but don't run it yet. Next, type in Listing 2, which is the machine language portion in the form of Basic Data statements. Don't worry, you'll only have to run all these Data statements once. Save Listing 2 to the same disk under any filename, then run it. The program will take a few moments to poke in the data before saving the machine language program to disk as a small binary object file.

For two-player games, you'll need two joysticks. That of player 1 plugs into port 2 (the rear port), while player 2's joystick plugs into port 1 (yes, I know it's a little confusing). For one player, the single joystick goes into port 2 as well.

Playing Alphabet Cadet

Now you're ready to play. Load and run the file that contains Listing 1; this automatically loads in the binary file created by Listing 2. If all goes as it should, you'll see a colorful title screen.

After you specify the number of players and the difficulty level, the main Alphabet Cadet screen appears. The left half of the screen is the playfield, where random letters scroll down from top to bottom. Sprite "guns" are positioned at the bottom of the playfield, the red for player 1 and the blue for player 2. You can move these guns left and right ►

RUN it right: **C-64; one or two joysticks**

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within the playfield boundary once play starts.

The right half of the screen displays the scores. At the top part of this half is a block reserved for the target word, as well as color-coded red and blue scoring blocks for players 1 and 2. Round-number and high-score information appears at the bottom of this half of the screen.

Press any key to begin. A target word appears in the block at the top of the scoring screen, then letters immediately begin scrolling downward toward the guns. When a letter appears that corresponds to one in the target word, position your gun directly beneath it and press the joystick button to fire. A successful hit moves the letter from the screen into your scoring block.

I stress "successful hit" for two reasons. First, just because you aim and fire at the letter doesn't guarantee you'll hit it. There are plenty of "duds" sprinkled throughout your arsenal, so be persistent. Second, your opponent is likely to be firing at the same letter. If he or she gets the letter first, you'll miss out on the points and, if you're playing at level 2, maybe a letter as well.

Level Play

In level 1 of Alphabet Cadet, geared toward younger players, the letters scroll down at a relatively slow pace, and your computer opponent targets only the letters that it needs. In level 2, the intensity of the game heats up considerably, with the computer opponent shooting like a maniac at all the letters it needs and every one you need as well!

In level 2 play, if both players possess a target-word letter, another hit on the letter removes it from the scoring block of the shooter's opponent, forcing him or her to fetch it again. Points are also awarded the shooter for removing an opponent's letter.

At level 2, you have essentially no time to study the board, especially when vying against the computer—which is one quick, intelligent and insensitive player. However, audio cues will help you keep abreast of what's occurring. When you or your opponent successfully shoots a letter, a low tone sounds, and when a letter is stricken from a player's scoring block, a high tone sounds. By listening to the tones, you'll soon know who's gaining and losing letters.

Winning the Game

The first player to match the target word wins the round and is awarded 100 points. In addition, each player earns points for the letters he or she possesses. Each letter has a value, with A worth the least and X worth the most. Bonus points are also added in, depending on the duration of the round—the longer it is, the more bonus points awarded. These bonus points for lengthy games serve as an incentive at level 2, since it's extremely difficult to survive against the computer at that level.

At the end of five rounds, the points are tallied and the winner's name flashed repeatedly. Keep in mind that the player who wins the most rounds won't necessarily be the final victor, since the point total determines that.

Strategy

Young children, four to five years old, should be introduced to Alphabet Cadet with the two-player option, and just be allowed to shoot the letters as they appear on the screen, without trying to hurry or compete. Just matching the words without any antagonist is a joyful and rewarding experience for most youngsters. Single Player mode, with the computer providing competition, isn't recommended for kids in this age group, since the computer doesn't miss too often, and frustration may set in.

Once the child is confident with the mechanics of the game and can quickly identify all the letters in each word, he or she can progress to competing against another player in Two Player mode or the computer in One Player mode.

Older players can pursue various strategies. In a level 1 game, you can't strike letters from your opponent's scoring block, but that doesn't mean you should sit around waiting for your last letter or two while your opponent has only one more to go! Try to shoot down his or hers as well. While you won't get points for them, you'll force your opponent to wait for later appearances of the letters.

At level 2—well, you're on your own. With two players, the intense competition could make mortal enemies out of entire families. Against the computer, you'll get short-changed, slam-dunked, deep-sixed and generally get the stuffing beat out of you, but keep trying. Soon you'll be winning consistently, even if you're not a champion joystick athlete.

Customizing Alphabet Cadet

Adding more rounds per game, as well as more target words, is very easy. At the beginning of Listing 1, you'll notice the variable NW%, which represents the number of words, and NR% (number of rounds). You can set NW% to any number from 1 to 100, or even more, if you adjust the DIM statements. But never set NW% to exceed the number of target words found in the Data statements, or you'll get an Out of Data error.

NW% corresponds to the number of target words in the Data statements at the end of Listing 1. To add new target words, simply type the new words into the Data statements and change the variable NW% accordingly. Then resave the program. Target words must be no longer than eight characters, with no embedded spaces or non-alphabetic characters.

To change the number of rounds needed to win, just change NR% to whatever value you'd like.

Though Alphabet Cadet plays more like an arcade game than an educational one, you'll be surprised at how quickly youngsters will be identifying letters and learning new words with this program—that is, if they can get Mom and Pop off the computer long enough to play! R

John Ryan, an air traffic control instructor by profession, is a freelance computer programmer in his spare time.

Listing 1. Alphabet Cadet program.

```
10 REM LISTING #1          :REM*63
20 REM ALPHABET CADET      :REM*206
30 REM (C) 1987 JOHN RYAN
                           :REM*58
40 REM ---> LOAD IN OBJECT FILE
   <---                    :REM*238
50 IF PEEK(16384)=173 THEN 90
                           :REM*33
60 IF FLAG THEN 90         :REM*156
70 FLAG=1:LOAD"+CADET.OBJ",8,1
                           :REM*237
80 :                       :REM*138
90 POKE 51,0:POKE55,0:POKE52,48
   :POKE54,48:CLR          :REM*42
100 DIM NM$(2),WRD$(100),CW%(10
   0)                      :REM*227
110 :                      :REM*168
120 REM --->{2 SPACEs}NW%=NUMBE
   R OF WORDS              :REM*10
130 REM --->{2 SPACEs}NR%=NUMBE
   R OF ROUNDS             :REM*87
140 :                      :REM*198
150 NW%=15:NR%=5           :REM*97
160 :                      :REM*218
170 R(1)=5:R(2)=14:R1(1)=7:R1(2
   )=16:C(1)=10:C(2)=14:V=5324
   8:RD%=1                 :REM*254
```


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ALPHABET CADET

```
18Ø TP$="{8 COMD Ps}":BT$="{8 C
    OMD Ys}"              :REM*38
19Ø ML=16384              :REM*236
2ØØ PRINTCHR$(147):POKE53281,7:
    POKE5328Ø,12:PRINT CHR$(154
    )                     :REM*221
21Ø RESTORE               :REM*95
22Ø R=6:C=14:GOSUB 95Ø    :REM*98
23Ø PRINT"WELCOME TO":R=9:C=12:
    GOSUB95Ø              :REM*188
24Ø PRINT"ALPHABET CADET!"
                          :REM*22Ø
25Ø POKE 82Ø,Ø:SYS ML     :REM*151
26Ø FOR A= 1 TO NW%:READ WRD$(A
    ):NEXT                :REM*166
27Ø I=12416:X=Ø           :REM*179
28Ø READ A:IF A=-1 THEN I=12288
    :X=Ø:GOTO28Ø          :REM*57
29Ø IF A=-2 THEN 31Ø      :REM*98
3ØØ POKE I+X,A:X=X+1:GOTO28Ø
                          :REM*246
31Ø PRINT CHR$(144)       :REM*243
32Ø FORA=1 TO NW%:CW%(A)=Ø:NEXT
                          :REM*237
33Ø R=12:C=13:GOSUB95Ø::REM*212
34Ø PRINT"WILL THERE BE":R=14:C
    =1Ø:GOSUB95Ø          :REM*66
35Ø PRINT"(1) OR (2) PLAYERS?"
                          :REM*81
36Ø POKE 198,Ø            :REM*237
37Ø GETA$:IF A$="" THEN 37Ø
                          :REM*2Ø
38Ø PN%=VAL(A$):IF PN%<1OR PN%>
    2 THEN 36Ø            :REM*125
39Ø :                     :REM*193
4ØØ PRINTCHR$(3Ø):R=17:C=Ø:GOSU
    B95Ø:I%=1             :REM*217
41Ø PRINT"PLAYER"I%"NAME---->";
    :INPUTNM$(I%):        :REM*89
42Ø L%=LEN(NM$(I%)):IF L%>1Ø TH
    EN NM$(I%)=LEFT$(NM$(I%),1Ø
    )                     :REM*87
43Ø IF I%<>PN%THEN I%=I%+1:GOTO
     41Ø                  :REM*1Ø3
44Ø IFPN%=1 THEN NM$(2)="COMPUT
    ER"                   :REM*147
45Ø PRINT CHR$(31)        :REM*31
46Ø R=21:C=7:GOSUB95Ø:PRINT"---
    >CHOOSE YOUR LEVEL<---"
                          :REM*1
47Ø R=23:C=9:GOSUB95Ø:PRINT"(1)
     EASY OR (2) HARD"    :REM*192
48Ø POKE198,Ø             :REM*1Ø2
49Ø GETA$:IFA$="" THEN 49Ø
                          :REM*242
5ØØ LE%=VAL(A$):IF LE%<1 OR LE%
    >2 THEN 49Ø           :REM*73
51Ø POKE 82Ø,1:SYS ML:POKE 822,
    PN%:POKE 824,LE%      :REM*52
52Ø POKE53265,PEEK(53265)AND239
                          :REM*47
53Ø POKE 53281,Ø:POKE 5328Ø,11:
    PRINT CHR$(147)CHR$(153):GO
    SUB91Ø:GOSUB86Ø       :REM*166
54Ø R=Ø:C=3Ø:GOSUB95Ø:PRINT"TAR
    GET"                  :REM*223
55Ø R=1:C=29:GOSUB 95Ø:GOSUB96Ø
    :I=1                  :REM*229
56Ø POKE 646,C(I):R=R(I):C=28:G
    OSUB95Ø:PRINT NM$(I):R=R1(I
    ):C=29:GOSUB95Ø       :REM*2Ø5
57Ø GOSUB 96Ø:PRINT"SCORE:"
                          :REM*199
58Ø I=I+1:IF I<3THEN56Ø   :REM*13
59Ø POKE646,1:R=22:C=28:GOSUB95
    Ø:PRINT"ROUND:":R=R+2:GOSUB
    95Ø:PRINT"HI:";       :REM*94
6ØØ FOR A=1Ø51 TO 1Ø51+(24*4Ø)S
    TEP4Ø:CL=55296+(A-1Ø24):POK
    EA,97:POKECL,5:NEXT:REM*232
61Ø POKE53265,PEEK(53265)OR16
                          :REM*95
62Ø R=7:C=7:GOSUB95Ø:PRINT"PRES
    S ANY KEY":POKE198,Ø:WAIT 1
    98,1:POKE198,Ø        :REM*25
63Ø TI$="ØØØØØØ"          :REM*112
64Ø :                     :REM*184
65Ø REM--> MAIN PROCESSING ROUT
    INE <--               :REM*24
66Ø :                     :REM*2Ø4
67Ø X=RND(1):D%=INT(RND(1)*NW%)
    +1:IF CW%(D%)=1 THEN67Ø:
                          :REM*147
68Ø CW%(D%)=1:R=2:C=29:POKE 199
    ,1:POKE 646,13:GOSUB95Ø
                          :REM*132
69Ø PRINT WRD$(D%);:L%=LEN(WRD$
    (D%)):L1%=L%          :REM*89
7ØØ IFL%<8THENL%=L%+1:PRINT" ";
    :GOTO7ØØ              :REM*76
71Ø POKE 82Ø,2:POKE 822,PN%:POK
    E 823,L1%             :REM*45
72Ø FOR A=1 TO L1%:T=ASC(MID$(W
    RD$(D%),A,1))-64:POKE 831+A
    ,T:NEXT               :REM*82
73Ø POKE V+21,255:POKE 2Ø4Ø,192
    :POKE 2Ø41,192:POKE 2Ø42,19
    4:POKE 2Ø43,194       :REM*1ØØ
74Ø POKE V+39,1Ø:POKE V+4Ø,14:P
    OKE V+41,1Ø:POKE V+42,14
                          :REM*28
75Ø POKE V,2Ø:POKE V+1,228:POKE
     V+2,228:POKE V+3,228:POKE
    82Ø,2                 :REM*214
76Ø SYSML:POKE 82Ø,1:SYS ML:POK
    E 82Ø,3:SYS ML        :REM*254
77Ø R=5:C=7               :REM*54
78Ø GOSUB 95Ø:PRINT"END OF ROUN
    D"RD%                 :REM*49
79Ø GOSUB 1Ø8Ø            :REM*99
8ØØ RD%=RD%+1:IFRD%=NR%+1 THEN
    82Ø                   :REM*44
81Ø GOTO52Ø               :REM*118
82Ø GOSUB 91Ø:GOSUB86Ø:POKE 82Ø
    ,3:SYS ML:R=8:C=2:GOSUB95Ø
                          :REM*235
83Ø PRINT"END OF GAME--HIT ANY
    KEY"                  :REM*29
84Ø RD%=1:GOSUB97Ø:       :REM*143
85Ø FORA=ØTO3:POKE 849+A,Ø:NEXT
    :POKEV+21,Ø:GOTO2ØØ:REM*233
86Ø IFRD%<=NR% THEN R=22:C=34:G
    OSUB95Ø:POKE646,1:POKE 199,
    1:PRINTRD%            :REM*2ØØ
87Ø R=24:C=31:GOSUB95Ø:PRINT HI
    ;CHR$(19)             :REM*171
88Ø POKE199,1:R=11:C=35:GOSUB95
    Ø:PRINT MID$(STR$(P1),2,5)
                          :REM*236
89Ø POKE199,1:R=2Ø:C=35:GOSUB95
    Ø:PRINT MID$(STR$(P2),2,5):
    RETURN                :REM*255
9ØØ REM ---> GET SCORE VALS <--
    --                    :REM*248
91Ø P1=PEEK(849)+PEEK(85Ø)*256:
    P2=PEEK(851)+PEEK(852)*256
                          :REM*2Ø9
92Ø IF P1>P2 AND HI<P1 THEN HI=
    P1:GOTO 94Ø           :REM*87
93Ø IFHI<P2 THEN HI=P2    :REM*31
94Ø RETURN                :REM*62
95Ø POKE 781,R:POKE 782,C:POKE
    783,Ø:SYS6552Ø:RETURN
                          :REM*221
96Ø PRINT TP$:R=R+2:GOSUB95Ø:PR
    INT BT$:R=R+2:GOSUB95Ø:RETU
    RN                    :REM*22
97Ø X1=1:R=5:C=8:GOSUB 95Ø:POKE
     198,Ø                :REM*52
98Ø PRINT"THE WINNER!":C=28
                          :REM*253
99Ø IFP1>P2 THEN X=1:R=5:GOTO 1
    Ø1Ø                   :REM*159
1ØØØ X=2:R=14             :REM*2Ø8
1Ø1Ø POKE 646,C(X)        :REM*46
1Ø2Ø GOSUB 95Ø:POKE 199,X1:PRIN
    TNM$(X)               :REM*175
1Ø3Ø FOR A=1 TO 5Ø:NEXT :REM*19
1Ø4Ø IF X1=Ø THEN X1=1:GOTO 1Ø6
    Ø                     :REM*224
1Ø5Ø X1=Ø                 :REM*173
1Ø6Ø GETA$:IF A$=""THEN 1Ø2Ø
                          :REM*122
1Ø7Ø RETURN               :REM*184
1Ø8Ø PRINT:T=PEEK(855):T1=PEEK(
    856):R=7:C=5:GOSUB 95Ø:GOS
    UB91Ø                 :REM*125
1Ø9Ø PRINT"SCORE=";:IF T>T1 THE
    N PRINT P1:POKE 825,1:GOTO
     111Ø                 :REM*57
11ØØ PRINT P2:POKE 825,2
                          :REM*221
111Ø GOSUB 116Ø           :REM*167
112Ø R=R+1:GOSUB 95Ø:PRINT"ROUN
    D= + 1ØØ PTS"         :REM*34
113Ø GOSUB 116Ø:B=INT(TI/12Ø):I
    F B>255 THENB=255 :REM*141
114Ø R=R+1:GOSUB 95Ø:PRINT"BONU
    S="B:POKE 826,B:POKE 82Ø,4
                          :REM*41
115Ø GOSUB 116Ø:SYS ML:RETURN
                          :REM*242
116Ø FOR A=1 TO 2ØØØ:NEXT:RETUR
    N                     :REM*46
117Ø REM------WORD DATA -------
                          :REM*255
118Ø DATA "HORSE","PUPPY","CAND
    Y","MOVIE","ROCKET","BIRTH
    DAY","CARTOON"        :REM*15Ø
119Ø DATA "CHILDREN","POPCORN",
    "SCHOOL","MOTHER","BIGBIRD
    ","PUPPET"            :REM*191
12ØØ DATA "FRIEND","BANANA"
                          :REM*1Ø2
121Ø REM ---> SPRITE DATA <---
                          :REM*139
122Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø ►
```


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ALPHABET CADET

```
     ,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
     ,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø    :REM*96
123Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,192,Ø,Ø
     ,192,Ø,Ø,192,Ø,Ø,192,Ø,Ø,1
     92,Ø,Ø,192,Ø,Ø      :REM*69
124Ø DATA 192,Ø,Ø,192,Ø,Ø,Ø,-1
                         :REM*133
125Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
     ,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
     ,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø    :REM*66
126Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,1,128,Ø
     ,3,192,Ø,3,192,Ø,127,254,Ø
     ,255,255,Ø,255     :REM*246
127Ø DATA 255,Ø,255,255,Ø,255,2
     55,Ø,Ø,-2          :REM*142
```

Listing 2. Machine language program.

```
Ø REM ALPHABET CADET LISTING 2
                         :REM*151
5 PRINT CHR$(147)CHR$(17)CHR$(1
  7)TAB(12)"PLEASE WAIT...":PRI
  NT                     :REM*65
1Ø I=16384:X=Ø           :REM*221
15 READ A:IF A=256 THEN 25
                         :REM*11Ø
2Ø POKE I,A:I=I+1:X=X+A:GOTO 15
                         :REM*36
25 IF X<>177197 THEN PRINTTAB(1
   1)"ERROR IN DATA...":END
                         :REM*131
3Ø SYS 57812"+CADET.OBJ",8,1:PO
   KE 193,Ø:POKE 194,64 :REM*6Ø
35 POKE 174,117:POKE 175,7Ø:SYS
    62957                :REM*219
4Ø PRINT" SAVE COMPLETE--CHECK
   DRIVE FOR ERRORS."    :REM*13
45 DATA 173,52,3,2Ø8,18,16Ø,Ø,1
   4Ø,81,3,14Ø,82,3,14Ø,83,3,14
   Ø,84,3,32,131          :REM*3
5Ø DATA 64,96,2Ø1,1,2Ø8,3,76,13
   8,255,2Ø1,2,2Ø8,82,32,219,69
   ,169,5,141,114         :REM*1Ø
55 DATA 7Ø,16Ø,2,14Ø,97,7Ø,16Ø,
   Ø,14Ø,92,7Ø,14Ø,7Ø,7Ø,14Ø,71
   ,7Ø,14Ø,68,7Ø          :REM*18
6Ø DATA 14Ø,69,7Ø,14Ø,87,3,14Ø,
   88,3,14Ø,65,7Ø,14Ø,67,7Ø,169
   ,26,141,93,7Ø          :REM*58
65 DATA 169,1Ø,141,24,212,162,Ø
   ,169,32,157,76,7Ø,232,224,16
   ,2Ø8,248,32,69         :REM*162
7Ø DATA 66,32,86,67,32,1Ø8,68,3
   2,247,66,32,1Ø2,69,176,242,9
   6,2Ø1,3,2Ø8,3          :REM*73
75 DATA 32,121,69,2Ø1,4,2Ø8,3,7
   6,23Ø,69,96,12Ø,169,157,141,
   2Ø,3,169,64            :REM*172
8Ø DATA 141,21,3,169,Ø,141,11,2
   2Ø,141,8,22Ø,169,9,141,59,7Ø
   ,88,96,2Ø6,59          :REM*198
85 DATA 7Ø,2Ø8,16,169,9,141,59,
   7Ø,162,15,173,4,22Ø,157,115,
   217,2Ø2,2Ø8            :REM*11
9Ø DATA 247,76,49,234,174,55,3,
   16Ø,Ø,185,64,3,2Ø5,1ØØ,7Ø,24
   Ø,6,2ØØ,2Ø2            :REM*191
95 DATA 2Ø8,244,56,96,24,96,174
   ,55,3,142,64,7Ø,169,255,141,
   112,7Ø,17Ø,232         :REM*81
1ØØ DATA 189,64,3,2Ø5,1ØØ,7Ø,24
    Ø,9,232,2Ø6,64,7Ø,2Ø8,242,7
    6,245,64,238,112      :REM*27
1Ø5 DATA 7Ø,172,112,7Ø,138,153,
    1Ø4,7Ø,76,223,64,173,112,7Ø
    ,141,64,7Ø,162,Ø      :REM*231
11Ø DATA 24,189,1Ø4,7Ø,141,113,
    7Ø,1Ø9,1Ø2,7Ø,168,185,76,7Ø
    ,2Ø5,1ØØ,7Ø,24Ø       :REM*221
115 DATA 2,24,96,232,2Ø6,64,7Ø,
    16,229,56,96,24,169,192,125
    ,92,7Ø,133,18Ø        :REM*84
12Ø DATA 169,7,133,181,96,56,18
    5,Ø,2Ø8,233,8,153,Ø,2Ø8,96,
    24,185,Ø,2Ø8,1Ø5      :REM*87
125 DATA 8,153,Ø,2Ø8,96,24,165,
    254,1Ø5,4Ø,133,254,165,255,
    1Ø5,Ø,133,255,24      :REM*29
13Ø DATA 165,251,1Ø5,4Ø,133,251
    ,165,252,1Ø5,Ø,133,252,96,5
    6,165,254,233,4Ø      :REM*71
135 DATA 133,254,165,255,233,Ø,
    133,255,56,165,251,233,4Ø,1
    33,251,165,252        :REM*18
14Ø DATA 233,Ø,133,252,96,169,Ø
    ,133,254,133,251,169,4,133,
    255,169,216,133       :REM*138
145 DATA 252,96,169,152,133,254
    ,133,251,169,7,133,255,169,
    219,133,252,96        :REM*237
15Ø DATA 173,56,3,2Ø1,2,24Ø,8,1
    69,3,141,73,7Ø,76,163,65,16
    9,2,141,73,7Ø         :REM*31
155 DATA 16Ø,Ø,136,2Ø8,253,2Ø6,
    73,7Ø,2Ø8,246,96,32,128,65,
    162,24,16Ø,Ø,177      :REM*2Ø6
16Ø DATA 254,72,177,251,41,15,7
    2,32,59,65,1Ø4,145,251,1Ø4,
    145,254,32,86,65      :REM*91
165 DATA 2ØØ,192,27,2Ø8,231,32,
    86,65,2Ø2,2Ø8,223,32,59,65,
    16Ø,Ø,169,32,145      :REM*51
17Ø DATA 254,169,Ø,145,251,2ØØ,
    192,27,2Ø8,243,173,56,3,2Ø1
    ,2,24Ø,6,2Ø6,114      :REM*217
175 DATA 7Ø,24Ø,15,96,2Ø6,114,7
    Ø,24Ø,1,96,169,2,141,114,7Ø
    ,76,6,66,169,5        :REM*145
18Ø DATA 141,114,7Ø,32,113,65,1
    69,26,141,6Ø,7Ø,32,47,66,17
    Ø,2Ø8,1,232,142       :REM*81
185 DATA 62,7Ø,142,99,7Ø,2Ø6,6Ø
    ,7Ø,32,47,66,168,14Ø,98,7Ø,
    173,62,7Ø,145         :REM*15
19Ø DATA 254,169,7,145,251,96,1
    69,255,141,15,212,169,128,1
    41,18,212,238,6Ø      :REM*2
195 DATA 7Ø,173,27,212,2Ø5,6Ø,7
    Ø,176,248,96,12Ø,169,82,141
    ,2Ø,3,169,66,141      :REM*119
2ØØ DATA 21,3,88,96,8,72,152,72
    ,138,72,173,56,3,2Ø1,2,24Ø,
    8,2Ø6,97,7Ø,24Ø       :REM*197
2Ø5 DATA 3,76,238,66,169,2,141,
    97,7Ø,32,174,65,162,2,142,6
    1,7Ø,162,Ø,16Ø,Ø      :REM*42
21Ø DATA 189,Ø,22Ø,41,15,2Ø1,11
    ,2Ø8,16,185,Ø,2Ø8,2Ø1,2Ø,24
    Ø,26,32,39,65         :REM*83
215 DATA 222,92,7Ø,76,162,66,2Ø
    1,7,2Ø8,13,185,Ø,2Ø8,2Ø1,22
    8,24Ø,6,32,49,65      :REM*137
22Ø DATA 254,92,7Ø,189,Ø,22Ø,41
    ,16,2Ø1,16,24Ø,3,254,7Ø,7Ø,
    173,54,3,2Ø1,1        :REM*84
225 DATA 24Ø,11,16Ø,2,232,2Ø6,6
    1,7Ø,2Ø8,187,76,238,66,173,
    65,7Ø,24Ø,41,16Ø      :REM*4
23Ø DATA 2,173,67,7Ø,24Ø,24,2Ø1
    ,255,24Ø,9,32,39,65,2Ø6,93,
    7Ø,76,223,66,32       :REM*2Ø2
235 DATA 49,65,238,93,7Ø,2Ø6,66
    ,7Ø,2Ø8,1Ø,169,Ø,141,65,7Ø,
    169,1,141,71,7Ø       :REM*116
24Ø DATA 1Ø4,17Ø,1Ø4,168,1Ø4,4Ø
    ,76,49,234,173,65,7Ø,24Ø,1,
    96,173,99,7Ø,141      :REM*229
245 DATA 1ØØ,7Ø,32,181,64,144,1
    ,96,16Ø,8,14Ø,1Ø2,7Ø,32,2Ø2
    ,64,144,19,173        :REM*4Ø
25Ø DATA 56,3,2Ø1,1,2Ø8,1,96,16
    9,Ø,141,1Ø2,7Ø,32,2Ø2,64,17
    6,1,96,238,65,7Ø      :REM*175
255 DATA 173,93,7Ø,2Ø5,98,7Ø,24
    Ø,15,144,19,16Ø,1,14Ø,67,7Ø
    ,56,237,98,7Ø         :REM*243
26Ø DATA 141,66,7Ø,96,169,Ø,141
    ,67,7Ø,96,169,255,141,67,7Ø
    ,56,173,98,7Ø         :REM*153
265 DATA 237,93,7Ø,141,66,7Ø,96
    ,173,71,7Ø,2Ø8,9,173,7Ø,7Ø,
    2Ø8,3,76,1Ø8,68       :REM*2Ø9
27Ø DATA 96,32,169,69,173,2,2Ø8
    ,24,1Ø5,8,141,6,2Ø8,174,3,2
    Ø8,142,7,2Ø8,162      :REM*197
275 DATA 1,32,26,65,162,23,56,1
    73,7,2Ø8,233,8,141,7,2Ø8,56
    ,165,18Ø,233,4Ø       :REM*16Ø
28Ø DATA 133,18Ø,165,181,233,Ø,
    133,181,32,143,65,16Ø,Ø
                          :REM*19
285 DATA 177,18Ø,141,72,7Ø,2Ø1,
    32,24Ø,3,76,17Ø,67,2Ø2,2Ø8,
    214,76,73,68          :REM*195
29Ø DATA 16Ø,Ø,177,18Ø,2Ø5,72,7
    Ø,24Ø,13,24,165,18Ø,1Ø5,4Ø,
    133,18Ø,165           :REM*51
295 DATA 181,1Ø5,Ø,133,181,169,
    32,145,18Ø,173,72,7Ø,141,1Ø
    Ø,7Ø,169,8,141        :REM*32
3ØØ DATA 1Ø2,7Ø,169,21,141,116,
    7Ø,32,181,64,176,112,32,2Ø2
    ,64,144,41,173        :REM*112
3Ø5 DATA 56,3,2Ø1,1,24Ø,1ØØ,169
    ,Ø,141,1Ø2,7Ø,32,2Ø2,64,144
    ,9Ø,172,113,7Ø        :REM*25Ø
31Ø DATA 169,32,153,93,5,169,Ø,
    153,76,7Ø,2Ø6,87,3,169,51,1
    41,116,7Ø,76          :REM*89
315 DATA 39,68,172,113,7Ø,173,1
    ØØ,7Ø,73,128,153,197,6,169,
    14,153,197,218        :REM*61
32Ø DATA 24,173,113,7Ø,1Ø5,8,16
    8,173,1ØØ,7Ø,153,76,7Ø,238,
```


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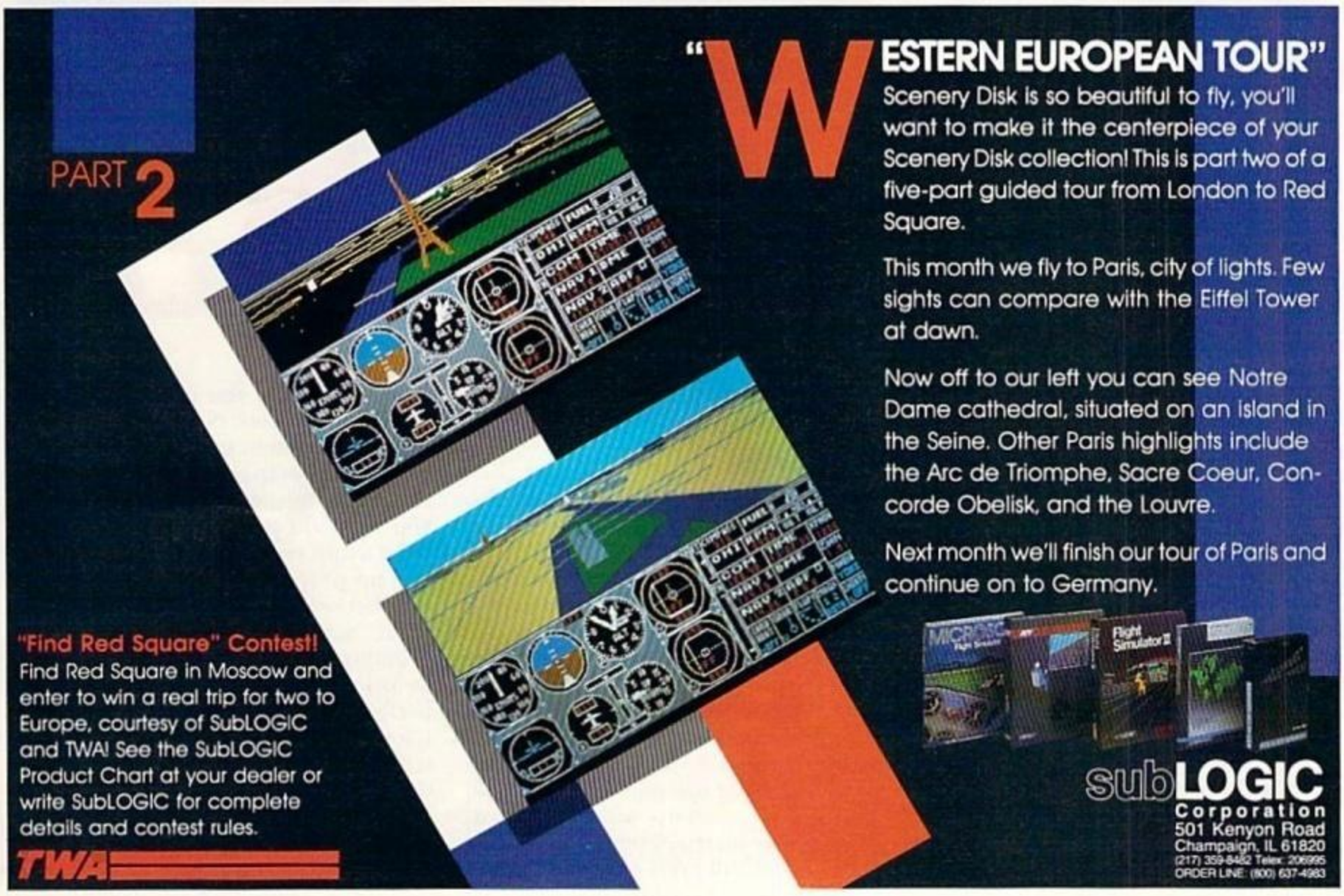
```
    88,3,16Ø,2,32          :REM*77
325 DATA 87,68,24,162,2Ø,16Ø,35
    ,32,24Ø,255,169,1,141,134,2
    ,16Ø,2,185,81          :REM*185
33Ø DATA 3,17Ø,2ØØ,185,81,3,32,
    2Ø5,189,32,144,69,169,Ø,141
    ,71,7Ø,169,Ø           :REM*238
335 DATA 141,7,2Ø8,141,6,2Ø8,96
    ,173,1ØØ,7Ø,1Ø,24,121,81,3,
    153,81,3,2ØØ           :REM*113
34Ø DATA 185,81,3,1Ø5,Ø,153,81,
    3,96,173,7Ø,7Ø,2Ø8,1,96,32,
    169,69,173,Ø           :REM*142
345 DATA 2Ø8,24,1Ø5,8,141,4,2Ø8
    ,174,1,2Ø8,142,5,2Ø8,162,Ø,
    32,26,65,162           :REM*62
35Ø DATA 23,56,173,5,2Ø8,233,8,
    141,5,2Ø8,56,165,18Ø,233,4Ø
    ,133,18Ø,165           :REM*56
355 DATA 181,233,Ø,133,181,32,1
    43,65,16Ø,Ø,177,18Ø,141,72,
    7Ø,2Ø1,32,24Ø          :REM*28
36Ø DATA 3,76,184,68,2Ø2,2Ø8,21
    4,76,88,69,16Ø,Ø,177,18Ø,2Ø
    5,72,7Ø,24Ø,13         :REM*115
365 DATA 24,165,18Ø,1Ø5,4Ø,133,
    18Ø,165,181,1Ø5,Ø,133,181,1
    69,32,145,18Ø          :REM*57
37Ø DATA 173,72,7Ø,141,1ØØ,7Ø,1
    69,21,141,116,7Ø,32,181,64,
    176,118,169,Ø          :REM*31
375 DATA 141,1Ø2,7Ø,32,2Ø2,64,1
    44,46,173,56,3,2Ø1,1,24Ø,1Ø
    1,169,8,141            :REM*23
38Ø DATA 1Ø2,7Ø,32,2Ø2,64,144,9
    1,172,113,7Ø,169,32,153,197
    ,6,24,152,1Ø5          :REM*6
385 DATA 8,168,169,Ø,153,76,7Ø,
    2Ø6,88,3,169,51,141,116,7Ø,
    76,54,69,172           :REM*89
39Ø DATA 113,7Ø,173,1ØØ,7Ø,73,1
    28,153,93,5,169,1Ø,153,93,2
    17,172,113,7Ø          :REM*33
395 DATA 173,1ØØ,7Ø,153,76,7Ø,2
    38,87,3,16Ø,Ø,32,87,68,24,1
    62,11,16Ø,35           :REM*18Ø
4ØØ DATA 32,24Ø,255,169,1,141,1
    34,2,16Ø,Ø,185,81,3,17Ø,2ØØ
    ,185,81,3,32           :REM*1Ø8
4Ø5 DATA 2Ø5,189,32,144,69,169,
    Ø,141,7Ø,7Ø,169,Ø,141,4,2Ø8
    ,141,5,2Ø8,96          :REM*96
41Ø DATA 162,Ø,189,87,3,2Ø5,55,
    3,24Ø,7,232,224,2,2Ø8,243,5
    6,96,24,96,32          :REM*15Ø
415 DATA 113,65,162,25,16Ø,Ø,16
    9,32,145,254,2ØØ,192,27,2Ø8
    ,247,32,59,65          :REM*116
42Ø DATA 2Ø2,2Ø8,239,96,169,Ø,1
    41,12,212,169,137,141,13,21
    2,173,116,7Ø           :REM*1Ø9
425 DATA 141,8,212,141,11,212,1
    69,16,141,11,212,96,169,Ø,1
    41,5,212,169           :REM*25
43Ø DATA 137,141,6,212,169,1,14
    1,Ø,212,169,14,141,1,212,16
    9,129,141,4            :REM*123
435 DATA 212,169,1,32,2Ø5,69,16
    9,128,141,4,212,96,141,115,
    7Ø,162,Ø,2Ø2           :REM*2Ø3
44Ø DATA 2Ø8,253,2Ø6,115,7Ø,2Ø8
    ,246,96,162,24,169,Ø,157,Ø,
    212,2Ø2,2Ø8            :REM*45
445 DATA 25Ø,96,174,57,3,189,56
    ,7Ø,168,169,1ØØ,141,75,7Ø,3
    2,36,7Ø,169,51         :REM*251
45Ø DATA 141,116,7Ø,169,1Ø,141,
    75,7Ø,173,57,3,2Ø1,1,24Ø,11
    ,16Ø,2,32,36           :REM*1
455 DATA 7Ø,32,44,68,76,25,7Ø,1
    6Ø,Ø,32,36,7Ø,32,59,69,169,
    255,32,2Ø5,69          :REM*227
46Ø DATA 2Ø6,58,3,2Ø8,22Ø,96,24
    ,185,81,3,1Ø9,75,7Ø,153,81,
    3,2ØØ,185,81,3         :REM*14
465 DATA 1Ø5,Ø,153,81,3,96,Ø,Ø,
    2,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
    ,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø       :REM*182
47Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,
    Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
    ,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø        :REM*85
475 DATA Ø,Ø,Ø,Ø,Ø,Ø,256
                           :REM*174 ■
```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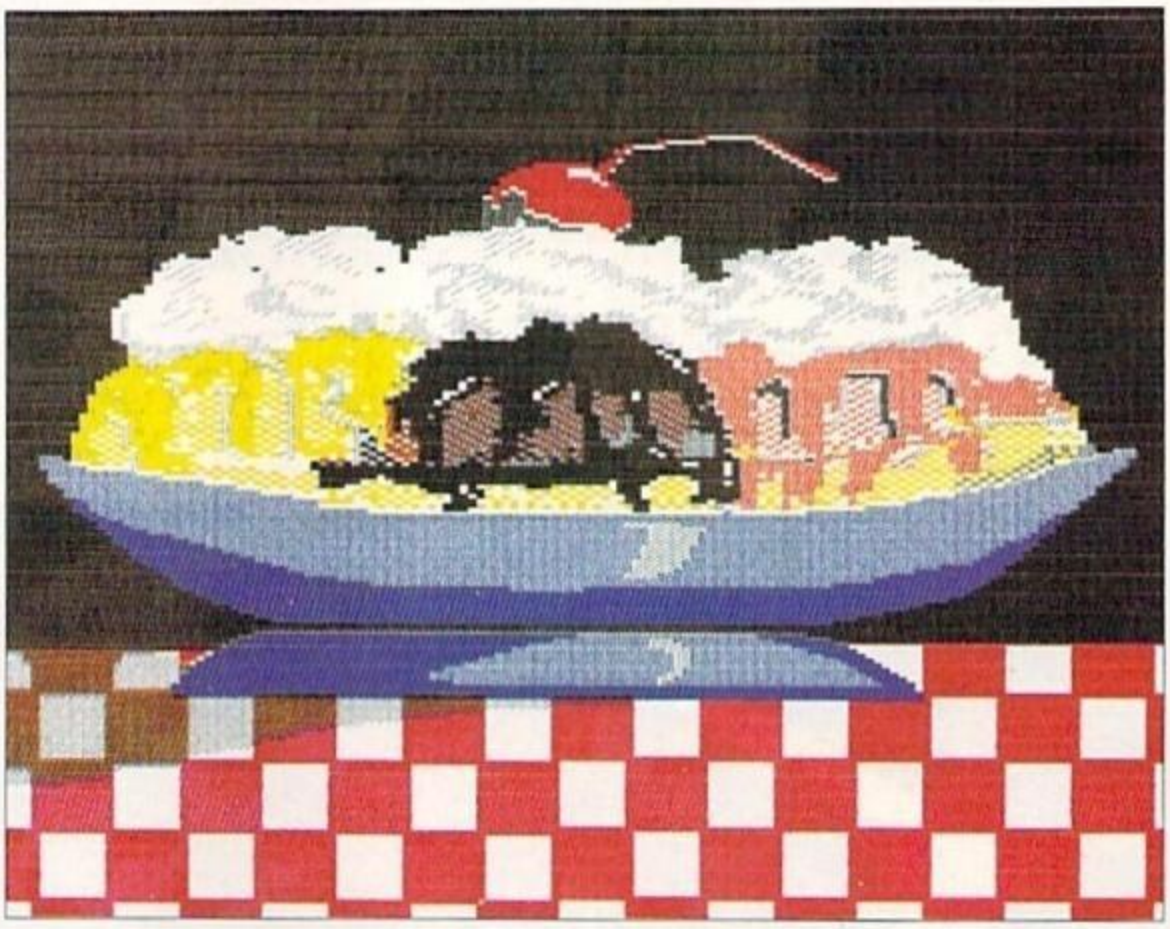
The Amazing

Sixteen-Color Print Machine

Transform your black-and-white Star- or Epson-compatible into a multicolor printer for Koala-format pictures.

By TED DAVIS



Colors so rich, you ask yourself: Is it real or is it a printout?

How often have you wanted to print out those beautiful, multicolor Koala-format pictures, but couldn't because a color printer is beyond your financial reach? Well, now you can do it by using this 16-Color Printer program with a Star Micronics- or Epson-compatible printer. You'll also need black, yellow, red and blue printer ribbons, some white paper and Koala-formatted pictures, either created by you or obtained from public domain sources, where many are available.

Sixteen-Color Printer reproduces the C-64 screen colors in much the same way that a variety of colors are printed in magazines and books: by layering black along with the primary colors—yellow, red and blue. An image is printed in each of these four colors separately and in the proper density (percent of coverage) to produce the requisite combined effect. The program proceeds to translate the densities to paper by making a certain number of pins in the print-head matrix hit the ribbon. Table 1 lists the density of each printer color needed to produce each of the 16 screen colors.

Type in and save Listing 1, using *RUN*'s Checksum program to catch any typing errors. Before you run the program, turn off the automatic linefeed on your printer, because the program produces its own. If you don't know how to do this, consult your printer manual for instructions.

When you run the program, a menu appears offering three options. F1 displays a directory of all the Koala pictures on a disk, each labeled with a letter from A to P. Pressing one of these keys loads the corresponding picture into memory. F3 displays on the screen the picture you've loaded; then any key returns you to the menu. F7 activates the print sequence for the picture currently in memory.

First Steps

The first phase of printing is the Picture Optimizer, which converts any secondary (defined but unused) colors to white. This will speed up the printing process. Press return to optimize or S to skip to the next step.

Now you need to insert your paper into the printer. Use at least two sheets (the thicker, the better) that are still attached. Although it's optional, in most cases you should clean the print head. You'll be using the yellow ribbon first, and ink on the pins will get it dirty. With paper inserted, remove your regular ribbon and press return to "print" five lines across the paper, removing ink in the process. Now you can place the yellow ribbon in the printer.

The final preparatory step is to align the paper in the printer, a procedure you must do precisely each time you print a different color, so the colors will line up properly. Position the perforation between two sheets just below the print head; then follow the screen prompts. Two short vertical lines will be printed near each other above the perforation. If they're far above, press L for a large adjustment. The paper will scroll a bit and each line will lengthen downwards. As the lines approach the perforation, press F for fine adjustment, then V for very fine adjustment. When the lines just touch the perforation, ►

RUN it right: **C-64; Star- or Epson-compatible printer; Koala-format pictures; color ribbons; white paper**

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you're done. The lines are printed in slightly different places each time you align the paper for a different color, so you can see what you're doing.

With the paper properly positioned, press Y to print the yellow, which is the first color in line. When it's done, you'll be prompted to swap ribbons, then reinsert and realign the paper. (I don't recommend rolling the paper back.) Continue aligning and printing until all four colors are done. If you want to skip a color, press S instead of Y.

Remember that printing multicolor, hi-res graphics is slow, because the computer has to calculate and send the equivalent of 800 characters to the printer for each line of print. Pressing F1 during printing increases the speed slightly by turning off the screen display. You can increase speed a lot with a Basic compiler. I use Blitz, which works three to four times faster.

If you need public domain Koala pictures, refer to the list of public domain software sources on page 85 in last April's issue of *RUN* or send a $3 money order for shipping and handling to the Commodore Computer Club of Toledo, PO Box 8909, Toledo, OH 43623, attn. Ted Davis. Ask for PD Disk HE. R

Ted Davis is a senior programmer and analyst with Software Alternatives.

Table 1. Densities (in percent) of yellow, red, blue and black the program uses to reproduce each of the C-64's 16 colors.

C-64		Printer			
Number	Color	Yellow	Red	Blue	Black
0	Black	—	—	—	100
1	White	—	—	—	—
2	Red	—	100	—	—
3	Cyan	10	—	10	—
4	Purple	—	100	33	—
5	Green	100	—	33	—
6	Blue	—	—	100	—
7	Yellow	100	—	—	—
8	Orange	100	50	—	—
9	Brown	100	50	33	—
10	Lt. Red	10	50	—	—
11	Gray 1	—	—	—	66
12	Gray 2	—	—	—	33
13	Lt. Green	100	—	10	—
14	Lt. Blue	—	—	33	—
15	Gray 3	—	—	—	10

Listing 1. Sixteen-Color Printer program.

```
10 GOTO1880          :REM*110
20 R1=1:RETURN       :REM*16
30 R2=1:RETURN       :REM*44
40 R3=1:RETURN       :REM*56
50 GOSUB560:CLR:GOSUB490:GOSUB1
   620               :REM*83
60 FORRB=3TO 0 STEP-1 :REM*83
70 GOSUB1810:GOSUB 830 :REM*61
80 IF Z$="S"THENGOTO410:REM*161
90 GOSUB1710:C%(0)=LC%(RB,PEEK(
   53281)AND15)      :REM*78
100 PRINT#4,E$;CHR$(51);GF$;LF$
   ;LF$;LF$;LF$;LF$;CR$;:REM*2
110 FOR I0=24576TO 32575 STEP 3
   20                :REM*214
120 FOR I1=I0 TO I0+4 STEP 4
                     :REM*116
130 GET T$:IF T$<>""THEN GOSUB7
   90                :REM*148
140 POKE781,4:SYS65481 :REM*254
150 LF=0:FL=0        :REM*78
160 FOR I2=I1 TO I1+312 STEP8
                     :REM*120
170 B4=INT((I2-24576)/8+23552)
                     :REM*150
180 B5=INT((I2-24576)/8+55296)
                     :REM*243
190 C%(2)=LC%(RB,PEEK(B4)AND15)
                     :REM*198
200 C%(1)=LC%(RB,(PEEK(B4)AND24
   0)/16)            :REM*114
210 C%(3)=LC%(RB,PEEK(B5)AND15)
                     :REM*237
220 X7=C%(0)+C%(1)+C%(2)+C%(3)
                     :REM*72
230 IFX7=0THENLF=LF+20:GOTO360
                     :REM*129
240 FOR I3=6TO0STEP-2 :REM*193
250 X5=2{UP ARROW}I3:X6=(2{UP A
   RROW}I3)*3        :REM*133
260 X1%=C%((PEEK(I2)ANDX6)/X5)
                     :REM*58
270 X2%=C%((PEEK(I2+1)ANDX6)/X5
   )                 :REM*235
280 X3%=C%((PEEK(I2+2)ANDX6)/X5
   ):X4%=C%((PEEK(I2+3)ANDX6)/
   X5)               :REM*15
290 X7%=X1%+X2%+X3%+X4% :REM*10
300 IFX7%=0THENLF=LF+5:GOTO350
                     :REM*13
310 IFX7%<>0THENGOSUB440:REM*77
320 FORI4=0TO4       :REM*224
330 PRINTCHR$(DT%(X1%,I4)*64+DT
   %(X2%,I4)*16+DT%(X3%,I4)*4+
   DT%(X4%,I4));     :REM*11
340 NEXT             :REM*215
350 NEXT             :REM*225
360 NEXT             :REM*235
370 IFFL>0THENGOSUB440 :REM*46
380 PRINTLF$;        :REM*51
390 NEXT             :REM*10
400 NEXT             :REM*16
410 NEXT             :REM*30
420 GOSUB1810:PRINT"{SHFT CLR}{
   6 CRSR DNs}{7 SPACEs}F I N
   I S H E D"        :REM*148
430 END              :REM*44
440 IFFL=0THENFL=1:PRINTE$;CHR$
   (76);CHR$(32);CHR$(3);
                     :REM*92
450 IFLF=0THENRETURN :REM*52
460 FORI5=1TOLF:PRINTCHR$(0);:N
   EXT               :REM*27
470 LF=0             :REM*129
480 RETURN           :REM*108
490 DIM LC%(3,15),DT%(6,4)
                     :REM*96
500 OPEN4,4,5:PRINTCHR$(142)
                     :REM*183
510 E$=CHR$(27):LF$=CHR$(10):CR
   $=CHR$(13)        :REM*43
520 POKE53280,1:GOSUB1810
                     :REM*216
530 PRINT"{SHFT CLR}{CTRL 1}{6
   CRSR DNs}{6 CRSR RTs}MAKE S
   URE YOUR PRINTER IS ONLINE"
                     :REM*181
540 GOSUB1160:GOSUB1480 :REM*43
550 RETURN           :REM*182
560 PRINT"{SHFT CLR}{5 CRSR DNs
   }{6 SPACEs}PICTURE OPTIMIZE
   R"                :REM*97
570 PRINT"{2 CRSR DNs}{6 SPACEs
   }WILL ELIMINATE ALL UNUSED"
                     :REM*96
580 PRINT"{2 CRSR DNs}{6 SPACEs
   }COLORS FROM PICTURE."
                     :REM*203
590 PRINT"{2 CRSR DNs}{6 SPACEs
   }PRESS RETURN TO RUN"
                     :REM*255
600 PRINT"{2 CRSR DNs}{6 SPACEs
   }OR PRESS 'S' TO"  :REM*208
610 PRINT"{2 CRSR DNs}{6 SPACEs
   }SKIP."           :REM*79
620 GETZ$:IFZ$=""THEN620
                     :REM*248
630 IF Z$="S"THEN RETURN
                     :REM*189
640 PRINT"{SHFT CLR}{5 CRSR DNs
   }{6 SPACEs}PICTURE OPTIMIZI
```


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COLOR PRINTER

```
    NG"                          :REM*165
65Ø BT=24576-8:BS=32576-1:BC=33
    576:BE=BC+999                :REM*6Ø
66Ø FORI=BC TO BE                :REM*237
67Ø BS=BS+1:BT=BT+8:BG=BT+7:R1=
    Ø:R2=Ø:R3=Ø                  :REM*113
68Ø FORJ=BT TO BG                :REM*77
69Ø ON(PEEK(J)AND192)/64GOSUB2Ø
    ,3Ø,4Ø                       :REM*124
7ØØ ON(PEEK(J)AND48)/16GOSUB2Ø,
    3Ø,4Ø                        :REM*171
71Ø ON(PEEK(J)AND12)/4GOSUB2Ø,3
    Ø,4Ø                         :REM*192
72Ø ONPEEK(J)AND3GOSUB2Ø,3Ø,4Ø
                                 :REM*35
73Ø NEXT                         :REM*95
74Ø IFR1=ØTHENPOKEBS,(PEEK(BS)A
    ND15)OR16                    :REM*237
75Ø IFR2=ØTHENPOKEBS,(PEEK(BS)A
    ND24Ø)OR1                    :REM*241
76Ø IFR3=ØTHENPOKEI,1            :REM*87
77Ø NEXT                         :REM*135
78Ø RETURN                       :REM*153
79Ø GETT1$:IFT1$<>""THEN T$=T1$
    :GOTO79Ø                     :REM*141
8ØØ IFT$="{FUNCT 1}"THENPOKE532
    65,PEEK(53265)AND239
                                 :REM*156
81Ø IFT$="{FUNCT 3}"THENPOKE532
    65,PEEK(53265)OR16           :REM*45
82Ø RETURN                       :REM*193
83Ø IFRB=ØTHEN D$="BLACK{2 SPAC
    Es}":D1$="{CTRL 1}":REM*127
84Ø IFRB=1THEN D$="BLUE ":D1$="
    {CTRL 7}"                    :REM*215
85Ø IFRB=2THEN D$="RED ":D1$="{
    CTRL 3}"                     :REM*17Ø
86Ø IFRB=3THEN D$="YELLOW ":D1$
    ="{CTRL 8}"                  :REM*1Ø7
87Ø PRINT"{SHFT CLR}{5 CRSR DNs
    }";D1$;"{6 SPACEs}INSTALL T
    HE ";D$;"RIBBON{2 SPACEs}"
                                 :REM*191
88Ø PRINT"{2 CRSR DNs}{6 SPACEs
    }ALIGN PAPER JUST ABOVE THE
    "                            :REM*1Ø7
89Ø PRINT"{2 CRSR DNs}{6 SPACEs
    }TOP OF FORM ."              :REM*7
9ØØ PRINT"{2 CRSR DNs}{6 SPACEs
    }THEN PRESS RETURN"          :REM*55
91Ø PRINT"{2 CRSR DNs}{6 SPACEs
    }OR PRESS 'S' TO"            :REM*231
92Ø PRINT"{2 CRSR DNs}{6 SPACEs
    }SKIP COLOR."                :REM*1Ø5
93Ø PRINT#4,CHR$(7);CR$;         :REM*61
94Ø GETZ$:IFZ$=""THEN94Ø
                                 :REM*116
95Ø IF Z$="S"THEN RETURN
                                 :REM*252
96Ø PRINT"{SHFT CLR}{5 CRSR DNs
    }{6 SPACEs}THIS PORTION OF
    THE PROGRAM"                 :REM*218
97Ø PRINT"{2 CRSR DNs}{6 SPACEs
    }IS USED TO ALIGN YOUR PAPE
    R"                           :REM*47
98Ø PRINT"{2 CRSR DNs}{6 SPACEs
    }IF PAPER IS ALIGNED PRESS
    'Y'"                         :REM*156
99Ø PRINT"{2 CRSR DNs}{6 SPACEs
```

```
    }ELSE PRESS"                 :REM*2ØØ
1ØØØ PRINT"{2 CRSR DNs}{7 SPACE
    s}'L' = LARGE ADJUSTMENT"
                                 :REM*2Ø7
1Ø1Ø PRINT"{2 CRSR DNs}{7 SPACE
    s}'F' = FINE{2 SPACEs}ADJU
    STMENT"                      :REM*11
1Ø2Ø PRINT"{2 CRSR DNs}{7 SPACE
    s}'V' = VERY FINE ADJUSTME
    NT"                          :REM*188
1Ø3Ø F$=CHR$(1)                  :REM*223
1Ø4Ø PRINT#4,E$;CHR$(51);F$;CR$
    ;LF$;                        :REM*19
1Ø5Ø PRINT#4,E$;CHR$(76);CHR$(3
    *(RB+1));CHR$(Ø);            :REM*172
1Ø6Ø FOR I=ØTORB:PRINT#4,;CHR$(
    Ø);CHR$(Ø);CHR$(Ø);:NEXT
                                 :REM*221
1Ø7Ø PRINT#4,E$;CHR$(76);CHR$(2
    );CHR$(Ø);CHR$(255);CHR$(2
    55);                         :REM*118
1Ø8Ø FOR I=ØTO2Ø:PRINT#4,CHR$(3
    2);:NEXT                     :REM*16
1Ø9Ø PRINT#4,E$;CHR$(75);CHR$(2
    );CHR$(Ø);CHR$(255);CHR$(2
    55);CR$                      :REM*229
11ØØ GETZ$:IFZ$=""THEN11ØØ
                                 :REM*1Ø2
111Ø IFZ$= "L"THENF$=CHR$(5)
                                 :REM*163
112Ø IFZ$= "F"THENF$=CHR$(3)
                                 :REM*117
113Ø IFZ$= "V"THENF$=CHR$(1)
                                 :REM*139
114Ø IFZ$<>"Y"THEN1Ø4Ø           :REM*123
115Ø RETURN                      :REM*9
116Ø FOR J=ØTO6                  :REM*231
117Ø FOR I=ØTO4                  :REM*235
118Ø READ A:DT%(J,I)=A:NEXT:NEX
    T                            :REM*17
119Ø DATA Ø,Ø,Ø,Ø,Ø:REM Ø%{4 SP
    ACEs}Ø                       :REM*126
12ØØ DATA Ø,1,Ø,Ø,2:REM 1Ø%{3 S
    PACEs}1                      :REM*183
121Ø DATA 2,Ø,1,2,Ø:REM 33%{3 S
    PACEs}2                      :REM*215
122Ø DATA 1,2,1,2,1:REM 5Ø%{3 S
    PACEs}3                      :REM*44
123Ø DATA 1,3,2,1,3:REM 66%{3 S
    PACEs}4                      :REM*131
124Ø DATA 3,2,3,1,3:REM 75%{3 S
    PACEs}5                      :REM*156
125Ø DATA 3,3,3,3,3:REM 1ØØ%{2
    SPACEs}6                     :REM*162
126Ø FORRB=ØTO3                  :REM*195
127Ø FORCL=ØTO15                 :REM*97
128Ø LC%(RB,CL)=Ø:NEXT:NEXT
                                 :REM*34
129Ø READ I,J,A                  :REM*59
13ØØ IFI=255THEN RETURN          :REM*67
131Ø LC%(I,J)=A:GOTO129Ø:REM*34
132Ø DATAØ,Ø,6 : REM BLACK
                                 :REM*155
133Ø DATA2,2,6 : REM RED:REM*11
134Ø DATA1,3,1, 3,3,1: REM CYAN
                                 :REM*53
135Ø DATA1,4,2, 2,4,6: REM PURP
    LE                           :REM*22
136Ø DATA1,5,2, 3,5,6: REM GREE
    N                            :REM*134
137Ø DATA1,6,6 : REM BLUE
                                 :REM*237
138Ø DATA3,7,6 : REM YELLOW
                                 :REM*98
139Ø DATA2,8,3, 3,8,6: REM ORAN
    GE                           :REM*139
14ØØ DATA1,9,2, 2,9,3, 3,9,6: R
    EM BROWN                     :REM*9
141Ø DATA2,1Ø,2,3,1Ø,1: REM LIG
    HT RED                       :REM*78
142Ø DATAØ,11,4 : REM GRAY 1
                                 :REM*16Ø
143Ø DATAØ,12,2 : REM GRAY 2
                                 :REM*179
144Ø DATA1,13,1,3,13,6:REM LIGH
    T GREEN                      :REM*199
145Ø DATA1,14,2 : REM LIGHT BLU
    E                            :REM*21Ø
146Ø DATAØ,15,1 : REM GRAY 3
                                 :REM*231
147Ø DATA255,255,255 : REM END
                                 :REM*156
148Ø PRINT"{SHFT CLR}{5 CRSR DN
    s}{6 SPACEs}TO CLEAN PRINT
     HEAD:"                      :REM*9
149Ø PRINT"{2 CRSR DNs}{6 SPACE
    s}REMOVE PRINTER RIBBON"
                                 :REM*121
15ØØ PRINT"{2 CRSR DNs}{6 SPACE
    s}INSERT PAPER"              :REM*116
151Ø PRINT"{2 CRSR DNs}{6 SPACE
    s}THEN PRESS RETURN"
                                 :REM*211
152Ø PRINT"{2 CRSR DNs}{6 SPACE
    s}OR PRESS 'S' TO"           :REM*76
153Ø PRINT"{2 CRSR DNs}{6 SPACE
    s}SKIP."                     :REM*2Ø2
154Ø PRINT#4,CHR$(7);CR$;
                                 :REM*149
155Ø GETZ$:IFZ$=""THEN155Ø
                                 :REM*84
156Ø IF Z$="S"THEN RETURN
                                 :REM*83
157Ø FOR J=1TO5                  :REM*141
158Ø PRINT#4,E$;CHR$(76);CHR$(1
    92);CHR$(3);                 :REM*142
159Ø FORI=1TO96Ø:PRINT#4,CHR$(2
    55);:NEXT                    :REM*58
16ØØ NEXT                        :REM*196
161Ø RETURN                      :REM*222
162Ø PRINT"{SHFT CLR}{5 CRSR DN
    s}{6 SPACEs}WHAT PRINTER D►
```


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COLOR PRINTER

```
    O YOU HAVE?"          :REM*19
163Ø PRINT"{2 CRSR DNs}{6 SPACE
    s}1 - GEMINI 1ØX"     :REM*173
164Ø PRINT"{2 CRSR DNs}{6 SPACE
    s}2 - EPSON"          :REM*168
165Ø PRINT"{2 CRSR DNs}{6 SPACE
    s}3 - IBM PROWRITER"
                          :REM*147
166Ø PRINT"{2 CRSR DNs}{6 SPACE
    s}ENTER 1 OR 3"       :REM*131
167Ø PRINT"{2 CRSR DNs}{6 SPACE
    s}THEN PRESS RETURN"
                          :REM*48
168Ø GETZ$:IFZ$<>"1"ANDZ$<>"2"A
    NDZ$<>"3"THEN168Ø     :REM*17
169Ø GF$=CHR$(24):IFZ$="1"THENG
    F$=CHR$(16)           :REM*172
17ØØ RETURN               :REM*53
171Ø POKE53265,PEEK(53265)AND23
    9:POKE56578,PEEK(56578)OR3
                          :REM*233
172Ø POKE53265,PEEK(53265)OR32
                          :REM*171
173Ø POKE5327Ø,PEEK(5327Ø)OR16
                          :REM*73
174Ø POKE56576,(PEEK(56576)AND2
    52)OR2                :REM*245
175Ø POKE53272,12Ø        :REM*196
176Ø SA=33576:EA=34575:NS=55296
    :GOSUB228Ø            :REM*168
177Ø SA=32576:EA=33575:NS=23552
    :GOSUB228Ø            :REM*212
178Ø POKE53281,PEEK(34576):POKE
    53265,PEEK(53265)OR16
                          :REM*157
179Ø POKE53265,PEEK(53265)OR16
                          :REM*62
18ØØ RETURN               :REM*145
181Ø POKE53272,21         :REM*32
182Ø POKE53265,27         :REM*1Ø9
183Ø POKE5327Ø,PEEK(5327Ø)AND23
    9                     :REM*223
184Ø POKE56576,(PEEK(56576)AND2
    52)OR3                :REM*73
185Ø POKE53281,1          :REM*152
186Ø SYS65484              :REM*1
187Ø RETURN               :REM*219
188Ø IFQ1=ØTHENCLR:DIMD$(16):Q=
    Ø:Q$=" "              :REM*23Ø
189Ø POKE55,Ø:POKE56,92   :REM*42
19ØØ Q1=Ø:GOSUB181Ø:POKE53281,1
    :POKE5328Ø,15         :REM*2Ø5
191Ø PRINT"{SHFT CLR}{CTRL 7}{C
    RSR DN}{6 SPACEs}THE 16 CO
    LOR PRINTER"          :REM*155
192Ø PRINT"{CRSR DN}{6 SPACEs}P
    RESS KEY OF YOUR CHOICE."
                          :REM*43
193Ø PRINT"{CRSR DN}{2 SPACEs}'
    F1'{5 SPACEs}LOAD DIRECTOR
    Y OF PICTURES"        :REM*31
194Ø PRINT"{2 SPACEs}'F3'{5 SPA
    CEs}VIEW PICTURE"     :REM*58
195Ø PRINT"{2 SPACEs}'F7'{5 SPA
    CEs}PRINT PICTURE":REM*2ØØ
196Ø IF Q=ØTHENPRINTQ$:GOTO199Ø
                          :REM*172
197Ø FORI=1TO Q           :REM*169
198Ø PRINTTAB(4);CHR$(I+64);TAB
    (11);D$(I):NEXT       :REM*92
199Ø GET A$:IFA$=""THEN199Ø
                          :REM*241
2ØØØ IF A$="{FUNCT 3}"THEN GOSU
    B2Ø7Ø:GOTO19ØØ        :REM*194
2Ø1Ø IF A$="{FUNCT 7}"THEN CLR:
    GOTO5Ø                :REM*13Ø
2Ø2Ø IFA$="{FUNCT 1}"THENGOSUB2
    1ØØ:GOTO19ØØ          :REM*255
2Ø3Ø IFQ=ØTHENPRINTQ$:GOTO19ØØ
                          :REM*123
2Ø4Ø IFASC(A$)<65ORASC(A$)>64+Q
    THENGOTO19ØØ          :REM*29
2Ø5Ø A=ASC(A$)-64:B=LEN(D$(A))-
    2                     :REM*153
2Ø6Ø Q1=1:LOADMID$(D$(A),2,B),8
    ,1                    :REM*4Ø
2Ø7Ø GOSUB171Ø            :REM*85
2Ø8Ø GETA$:IFA$=""THEN2Ø8Ø
                          :REM*146
2Ø9Ø GOSUB181Ø:RETURN     :REM*163
21ØØ CLOSE2:OPEN2,8,15:PRINT#2,
    "I"                   :REM*91
211Ø CLOSE1:OPEN1,8,Ø,"$Ø"
                          :REM*53
212Ø Q=Ø:Q$="NO PICTURES ON DIS
    K"                    :REM*135
213Ø GET#1,B$,B$          :REM*55
214Ø GET#1,B$,B$,B$,B1$:C=Ø
                          :REM*2Ø8
215Ø IFB$<>""THENC=ASC(B$)
                          :REM*76
216Ø IFB1$<>""THENC=C+ASC(B$)
                          :REM*134
217Ø IFC<>4Ø THEN223Ø     :REM*97
218Ø Q=Q+1:D$(Q)=CHR$(34)
                          :REM*56
219Ø GET#1,B$:IFST<>ØTHEN226Ø
                          :REM*2Ø7
22ØØ IFB$<>CHR$(34)THEN219Ø
                          :REM*33
221Ø GET#1,B$:IFB$<>CHR$(34)THE
    ND$(Q)=D$(Q)+B$:GOTO221Ø
                          :REM*217
222Ø D$(Q)=D$(Q)+CHR$(34)
                          :REM*65
223Ø GET#1,B$:IFST<>ØTHEN226Ø
                          :REM*247
224Ø IFB$<>""THEN223Ø     :REM*138
225Ø GOTO214Ø              :REM*6
226Ø CLOSE1               :REM*223
227Ø RETURN               :REM*1Ø1
228Ø EA=EA+1:L=EA-SA:NE=L+NS
                          :REM*167
229Ø X=INT(L/256):Y=L-256*X
                          :REM*38
23ØØ A=INT((NE-Y)/256):B=NE-256
    *A-Y                  :REM*86
231Ø C=INT((EA-Y)/256):D=EA-(25
    6*C)-Y                :REM*248
232Ø POKE781,X+1:POKE782,Y
                          :REM*154
233Ø POKE 88,B+1:POKE 89,A
                          :REM*22
234Ø POKE 9Ø,D+1:POKE 91,C
                          :REM*221
235Ø SYS41964             :REM*252
236Ø POKE NS,PEEK(SA)     :REM*154
237Ø RETURN              :REM*217 ■
```


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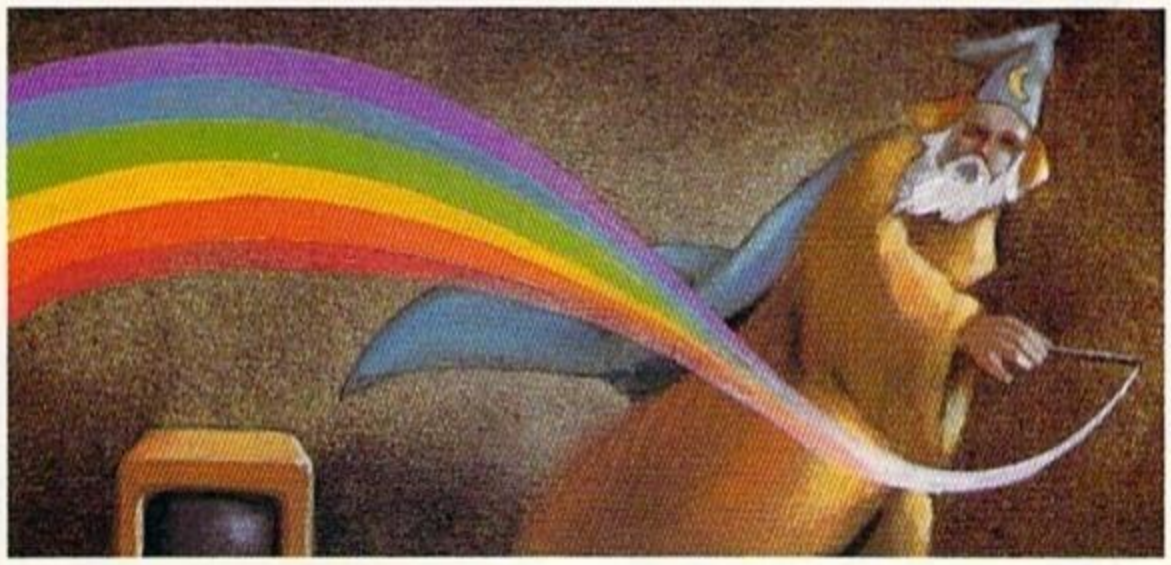
Color Cornucopia

Spice up your C-128's 80-column screen with more color variations than you can imagine.

By TIM WALSH



If you thought the C-128 couldn't produce more than 16 colors, think again! It can make lots more—and all it needs is an 80-column RGB monitor, such as a Commodore 1902, that will work with the program (the 1902A and possibly other monitors will not), and the 80-Column Color Maker.

How many colors can it produce? Well, that's not easy to determine, but a conservative estimate would place the number at over three hundred distinct hues!

Experienced C-128 programmers are aware that you can scroll the contents of the 80-column screen horizontally. Eighty-Column Color Maker is a modification of the routine that does this scrolling, thus enabling the dazzling color cycling.

No programming tricks are involved. Color Maker draws bars on the screen of all the C-128's 16 colors and then scrolls them to the right. The colors wrap around to the left until the original screen display has scrolled completely off the screen to the right, whereupon the scrolling reverses and begins the trip back to the leftmost position.

As the display scrolls back and forth, the characters and background cycle through an incredible range of hues. In fact, so many colors appear that you'll find counting them futile.

Type in Listing 1, using *RUN*'s Checksum program, and save a copy to disk before you run it. When you do run it, pressing any key at any time will pause the action, so you can examine the varied colors in detail. Pressing any key will then resume the scrolling. To stop the program completely, just press the run-stop/restore combination.

Eighty-Column Color Maker is a fine utility to have at your disposal. You can use it as a routine to spice up text adventures, call attention to errors in application and utility programs, create Amiga-like title screens, and much more! Let your imagination run free—and when you come up with your own interesting ideas, let me know! R

Tim Walsh, RUN's technical editor, is also the editor of ReRUN, the bimonthly disk of RUN's published programs.

Listing 1. 80-Column Color Maker program.

```
Ø REM C-128 8Ø-COLUMN COLOR MAK
  ER - T. WALSH          :REM*116
1Ø DIM A$(16)            :REM*115
2Ø B$="{CTRL 9}{29 SPACEs}PRESS
   ANY KEY TO PAUSE{29 SPACEs}
   {CTRL Ø}"             :REM*228
3Ø A$(Ø)="{CTRL 1}"+B$:A$(1)="{
   CTRL 2}"+B$:A$(2)="{CTRL 3}"
   +B$:A$(3)="{CTRL 4}"+B$:A$(4
   )="{CTRL 5}"+B$:A$(5)="{CTRL
    6}"+B$               :REM*43
4Ø A$(6)="{CTRL 7}"+B$:A$(7)="{
   CTRL 8}"+B$:A$(8)="{COMD 1}"
   +B$:A$(9)="{COMD 2}"+B$:A$(1
   Ø)="{COMD 3}"+B$:A$(11)="{CO
   MD 4}"+B$             :REM*1Ø4
5Ø A$(12)="{COMD 5}"+B$:A$(13)=
   "{COMD 6}"+B$:A$(14)="{COMD
   7}"+B$:A$(15)="{COMD 8}"+B$
                         :REM*249
6Ø SCNCLR:FAST:T=1:FOR I=Ø TO 1
   5:PRINT A$(I):NEXT    :REM*2
7Ø Q=1:R=2:S=DEC("D6ØØ"):T=T+Q:
   U=116:GOSUB 19Ø:COLOR6,T
                         :REM*65
8Ø FORX = Ø TO U         :REM*128
9Ø GOSUB 21Ø             :REM*156
1ØØ GET AA$:IF AA$<>"" THEN 17Ø
                         :REM*237
11Ø NEXT                 :REM*24Ø
12Ø FORX = U TO Ø STEP-Q:REM*33
13Ø GOSUB 21Ø            :REM*196
14Ø GET AA$:IF AA$<>"" THEN 18Ø
                          :REM*36
15Ø NEXT                  :REM*25
16Ø GOTO7Ø                :REM*37
17Ø GETKEY K$:AA$="":GOTO 9Ø
                         :REM*198
18Ø GETKEY K$:AA$="":GOTO 13Ø
                         :REM*142
19Ø IF T=17 THEN T=Q     :REM*1Ø5
2ØØ RETURN                :REM*87
21Ø POKES,R:POKES+Q,(U+Q)-X
                          :REM*9Ø
22Ø RETURN              :REM*1Ø7 ■
```

RUN it right: **C-128; Commodore 1902 monitor, or the equivalent**

ILLUSTRATED BY TIM JONKE

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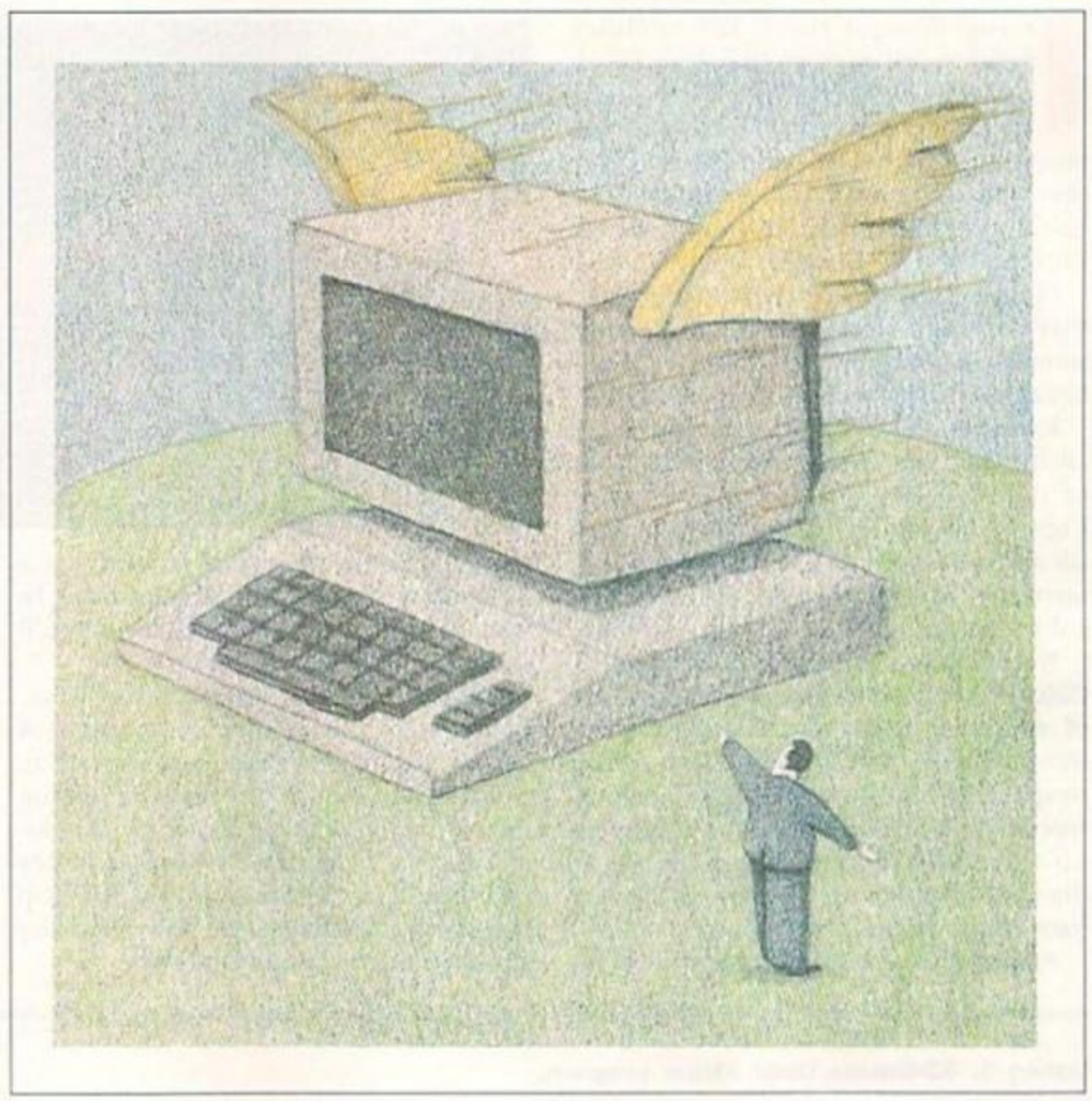
Unlike people, all compilers are not created equal.
Some will give you faster action than others.



By LOU WALLACE

Although there are faster and more efficient programming languages available for the C-64 and C-128, Basic remains the language of choice for the overwhelming majority of programmers. However, there are times when Basic just doesn't run fast enough. The best solution is to convert your Basic program into machine language, but learning machine language is a pretty drastic step. No matter—there's an easier approach: Use a compiler.

Fine, but what is a compiler, and how does it make programs run faster? First of all, Basic is an interpreted language, which means that every statement and every line must be converted to machine language *every time* it's executed. For example, given a small For-Next loop that repeatedly prints HELLO, the computer must convert the Print statement over and over again.

A compiler, on the other hand, converts the statement to machine language just once. Then it's executed at maximum speed each time through the loop. Compilers also make all the addresses of variables and data available at runtime, whereas interpreters have to look them up each time they're used.

Some compilers can further enhance performance through optimization. This means they're "intelligent" enough to analyze a Basic program and make changes to it that increase speed, usually without altering the function the program performs.

In this article, I'll survey seven Basic compilers, three for the C-64 and four for the C-128. To compare their efficiency, I wrote eight benchmark programs, each of which performed a specific activity. By compiling each benchmark with each compiler and measuring the speed of execution in the process, I was able to compare the efficiency of the various compilers with one another as well as with the run times of execution in Basic. The results of these tests appear in Table 1.

Table 2 shows the sizes of the compiled programs. As you can see, compiling a small program generates a much larger one (except with very large Basic programs, which generally end up smaller). Refer to Table 3 for a list of manufacturers and prices.

The Benchmarks

1. Floating-Point Math. This program performs 1000 floating-point operations (addition and multiplication).

2. Trigonometry. This program calculates the sine of a number 1000 times. Trig functions are transcendental, and calculating them is notoriously slow.

3. Disk Input and Output. Using Basic 2.0 commands, this program opens a file, writes 256 bytes to it and closes the file. Then it reopens the file, reads the 256 bytes back and closes the file again. Finally, it scratches the file from the disk.

4. Strings. Benchmark 4 manipulates a string 256 times, printing it to the screen as it goes through the loop.

5. C-64 Sprites. Making use of Peeks and Pokes, this program generates a sprite and moves it back and forth across ►

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the full width of the screen ten times.

6. C-64 Bitmap Graphics. Also using only Peek and Poke commands, this program generates a hi-res screen and plots a sine wave. Based on an example in the *C-64 Programmers Reference Guide*, it places the graphics screen at address 8192 (decimal). None of the C-64 compilers executed this program properly, as the screen conflicted with the location of the compiled code, even though I moved the start of Basic up above the screen before running the compiled versions.

7. C-128 Bitmap Graphics. This program creates the same sine wave as the C-64 version, but uses the Basic 7.0 graphics commands to generate the plot.

Table 1. Benchmark speeds, in seconds.

	B1	B2	B3	B4	B5	B6	B7	B8
C-64:								
Basic 2.0	16.73	17.86	18.41	8.55	20.63	64.92		
Blitz 64	2.74	16.47	16.43	6.15	8.11	*		
Basic 64	2.49	16.37	16.53	7.30	6.89	*		
Petspeed 64	2.17	16.11	15.97	6.17	5.58	*		
C-128: **								
Basic 7.0	18.43	20.04	16.72	11.20			20.76	33.50
Blitz 128	3.60	18.28	15.00	9.32			15.32	10.31
Basic 128	2.73	13.77	14.65	9.36			12.79	10.09
Gnome Speed 128	4.10	19.04	15.06	9.98			16.58	13.02
Petspeed 128	2.58	17.58	15.10	8.35			20.83	57.28

* Didn't run properly.
** All C-128 times in 40-Column Slow mode.

Table 2. Compiled program sizes, in disk blocks.

	B1	B2	B3	B4	B5	B6	B7	B8
C-64:								
Basic 2.0	1	1	2	1	3	4		
Blitz 64	25	25	25	25	25	26		
Basic 64	23	23	24	23	26	25		
Petspeed	33	33	33	33	34	34		
C-128:								
Basic 7.0	1	1	2	1	3	4	2	2
Basic 128	38	51	39	38			52	39
Blitz 128	44	44	44	44			46	44
Gnome Speed 128*	1	1	2	1			1	1
Petspeed 128	49	49	50	49			50	50

* 49-block runtime module required.

Table 3. Manufacturers and prices.

Basic 64 and **Basic 128**
Abacus Software
5370 52nd St. SE
Grand Rapids, MI 49508
$39.95 and $59.95, respectively

Blitz 64 and **Blitz 128**
Skyles Electric Works
231-E S. Whisman Rd.
Mountain View, CA 94041
$49.95 and $59.95, respectively

Gnome Speed 128
Briwall
PO Box 129
Kutztown, PA 19530
$29

Petspeed 64 and **Petspeed 128**
Systems Software (Oxford) Ltd.
Distributed in the U.S. by
Progressive Peripherals & Software
464 Kalamath St.
Denver, CO 80204
$29.95 and $34.95, respectively

8. C-128 Sprites. This program is the same as that for the C-64, except it uses Basic 7.0's Sprite and MovSpr commands instead of Peeks and Pokes.

The C-64 Compilers

Blitz 64, from Skyles Electric Works, supports nearly all of Basic 2.0's commands and performs its task well. Menu driven, it's quite easy to use, and the programs it produces are fairly fast. Blitz 64 lets you include embedded compiler directives in your programs, but otherwise offers little control over the generation of compiled programs. You can compile only one program at a time, and then must rerun Blitz 64 when you want to do another. The compiler crashed occasionally, but generally it behaved well. The disk is copy-protected, so you can't make backups to use as work disks.

I found **Basic 64**, from Abacus, to be the best all-around compiler for the C-64. It's versatile, offering many options from its menu-driven display, several levels of optimization and a choice between creating pure 6502/6510 code (fastest, but longer programs) or P-code (Pseudo-code—not as fast, but smaller programs). It also lets you change the starting address of your compiled programs, use extensions to Basic 2.0 and compile as many programs at one sitting as you wish, without reloading the compiler. The code Basic 64 generated in my tests was quite fast. This disk, too, is copy-protected.

I was quite surprised at the speed of the programs generated by **Petspeed 64**, from Systems Software. With every benchmark, this four-pass, optimizing compiler produced the fastest compiled program. However, it offers little control over the compiling process, and the programs it produced were larger than those generated by the other two C-64 compilers. This disk can be copied (using any backup program you want), but the software is protected by an irritating color chart technique: You must answer three questions about the colors on a grid of paper *every time* you run the program—and you can compile only one program at a time. Petspeed 64 also requires that you make *four* working disks before you begin compiling, and its copying method is extremely slow!

The C-128 Compilers

Blitz 128, another product of Skyles Electric, is an improved version of Blitz 64. Again, the program is menu-driven and generally quite fast, but this time you get more control over the compiling process. Blitz 128 allows extensions

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to Basic 7.0 (I compiled some Ultra Hi-Res programs successfully), and it supports program chaining. There are more embedded compiler directives here than in the 64 version, plus support for multiple drives, and you can compile more than one program without reloading. Also, this disk isn't copy-protected, and backups are easy to make. Blitz 128 does require a dongle to run, which I consider a nuisance, but at least you can make work disks.

Functionally, Abacus's **Basic 128** is practically the same as the C-64 version, meaning it's very fast (actually faster in many cases) and versatile (even somewhat more versatile). It offers the widest range of options of any of these compilers, among them two levels of optimization and almost complete control over the placement of the compiled program. You can incorporate the runtime module in each program or leave it out, at your pleasure. (The module need be loaded only once, which is useful for chained or overlayed programs.) Basic 128 works in 40- or 80-Column mode and supports embedded directives, some extensions to Basic 7.0 and the C-128's Fast mode when compiling and executing programs. The compiler settings can be saved to disk and loaded as needed. This is another copy-protected disk.

Systems Software's **Petspeed 128** is a reworked version of Petspeed 64. Overall, the code it generated was slower than that of the C-64 version, and in two cases (Graphics and Sprites) the compiled code was even as slow or slower than the uncompiled programs. However, Petspeed 128 is improved over the C-64 version in allowing a few embedded compiler directives and not requiring the four work disks. There's no support for program chaining, and you must go through the same irritating color routine as with the 64 version each time you run the program.

Gnome Speed 128, from Briwall, is the simplest of the compilers for the C-128 in terms of features. It compiles fewer Basic 7.0 commands than the others, doesn't allow chained programs and places restrictions on the number of variables, lines and branches you can have in the programs you compile. Also, on the whole it produced the slowest compiled code of the group. The programs Gnome Speed creates aren't stand-alone, but require a 49-block runtime module to be loaded into memory first. Then the compiled program is loaded by a boot program. The Gnome Speed disk isn't copy-protected.

The Bottom Line

Based on my experience with all these compilers, I consider Basic 64, from Abacus, the best C-64 Basic compiler available. It's fast, produces the smallest compiled programs and has the most features.

For C-128 programs, my choice is Basic 128, also from Abacus. It offers all the features of the C-64 version—and then some. ■

Lou Wallace, RUN's *technical manager, has been programming with Commodore computers for many years.*

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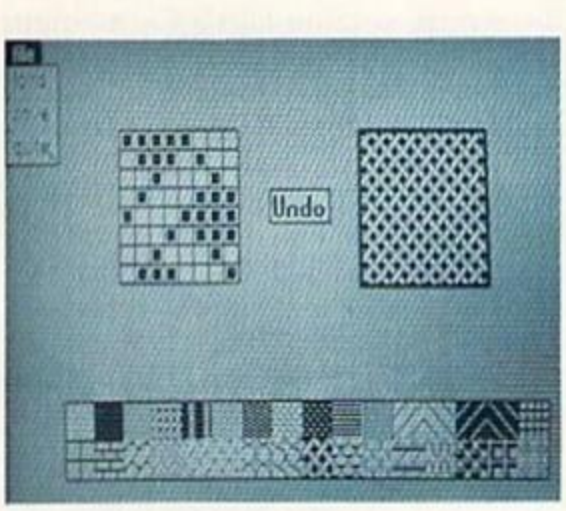

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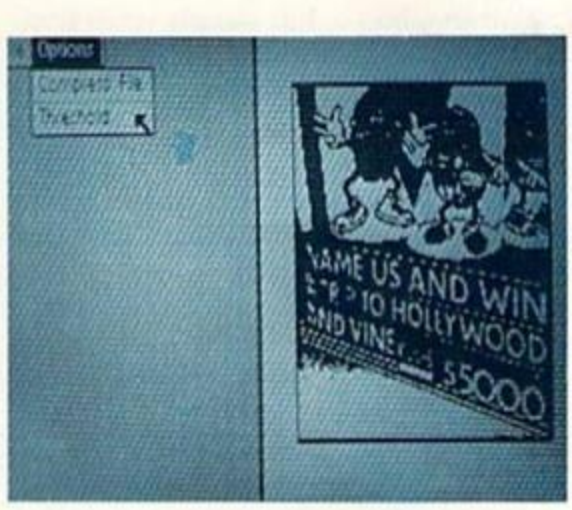

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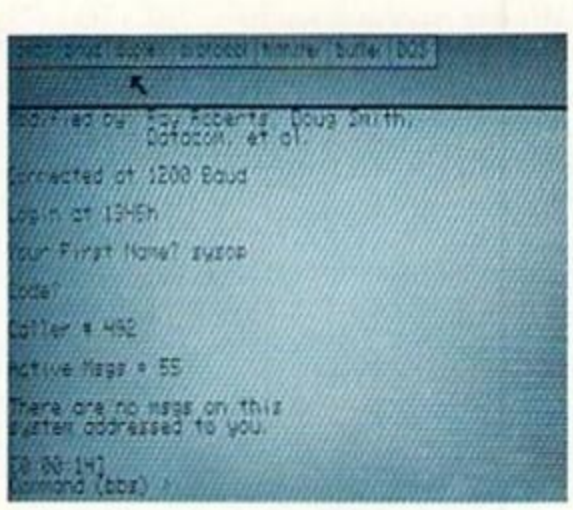

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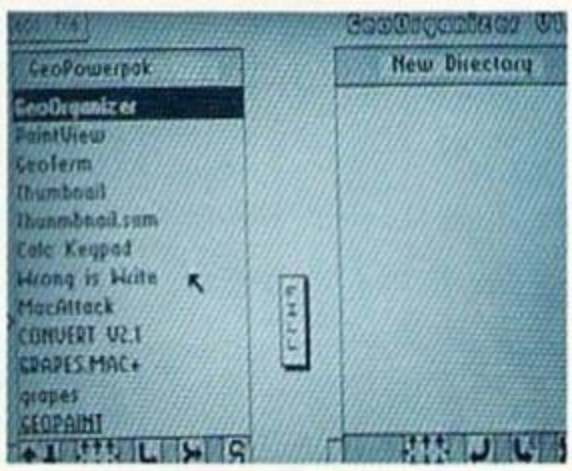

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Bill Minder

Get control of your finances by keeping organized records of your expenses.

By JEROME REUTER

Do you have a clear idea how much your expenses are going up—or down? If not, you're not in control of your finances. Bill Minder, my easy-to-use combination spreadsheet and database program, will help you get in control by organizing all your monthly bills and financial records and displaying them in various handy formats.

Written entirely in Basic 7.0, Bill Minder operates in the C-128's 80-Column mode. Each of the program's data files can store up to 12 months' worth of financial records, and you can keep as many files as you want by just changing data disks.

Type in Listing 1, using *RUN*'s Checksum program, and then save it to disk. When you run the program, the first screen you'll see is blank except for a menu, listing the eight function keys, stretched across the top. The function keys are defined as follows:

F1. Loads the sequential data file, named DATA FILE.BM, from disk.

F2. Saves an updated data file back to disk. Bill Minder also automatically saves a backup of the file. If you ever lose your work file, just rename the backup file DATA FILE.BM and load it with F1.

F3. Finds any dollar amount, checks the number or date; in addition, it searches for duplicates.

F4. Accesses the Enter mode, where you can type in new data, view the data that you've already entered and make changes.

F5. Displays a bar graph representing the monthly figures for any account (financial category) in your file. This option can reveal at a glance trends such as how much your electric bills went up last winter or what impact Christmas expenditures had on your credit card balance.

F6. Presents a tally sheet showing a total for each account for the months entered and a grand total for all your accounts.

F7. Produces a printout of any individual financial record, all the records for any month or any account for all the months entered.

F8. Creates a data file.

To exit Bill Minder, press any key other than a function key when you're at the main menu.

When you're setting up your "spreadbase" for the first time, select F8 and follow the prompts to input the names of your accounts and write your data file to disk. Then press F4 to access Enter mode.

In Enter mode, you'll see the accounts you named listed down the left side of the screen, column labels for amount, data, check number and memo across the top, and a place for monthly totals across the bottom. Each month occupies one page, and you can flip through the pages to add or correct records by pressing the N key. Unlike a spreadsheet, Bill Minder doesn't require you to move the cursor all around the screen to enter and correct data, and you never lose sight of your column headings and totals. R

Jerome Reuter, a retired naval chief petty officer, runs a small contracting business, for which he's written the software he uses. He has also published several programs.

Listing 1. Bill Minder program.

```
Ø REM BILL MINDER 128 - JEROME
  REUTER                    :REM*249
1Ø FAST:DIM MN$(12),AR$(2Ø4,5):
  FL=Ø                      :REM*156
2Ø GOSUB133Ø:D1$="{HOME}{4 CRSR
   DNs}":D2$="{HOME}{23 CRSR D
  Ns}"                      :REM*58
3Ø FORJ=1TO8:KEYJ,CHR$(132+J):N
  EXT                       :REM*14Ø
4Ø FORJ=1TO12:READ MN$(J):NEXT
                            :REM*1Ø
5Ø PRINT"{HOME}{3 CRSR DNs}{14
  SPACEs}":PRINTD1$CHR$(27)+"@
  "                         :REM*25Ø
6Ø GOSUB 142Ø:GETKEYA$:IFA$<CHR
  $(133)ORA$>CHR$(14Ø)THENGOTO
  139Ø                      :REM*238
7Ø ON ASC(A$)-132 GOSUB 9Ø,16Ø,
  21Ø,36Ø,67Ø,8ØØ,88Ø,121Ø
                            :REM*114
8Ø GOTO 5Ø                  :REM*21Ø
9Ø REM [F1] LOAD FILE       :REM*73
1ØØ PRINTD1$CHR$(27)+"@{CTRL 7}
  LOAD FILE...":IFFL=ØTHEN13Ø
                            :REM*135
11Ø PRINT"{CTRL 7}THIS WILL DES
  TROY FILE IN MEMORY"
                            :REM*18Ø
12Ø PRINT"{2 CRSR DNs}{CTRL 7}P
  RESS {CTRL 9}C{CTRL Ø} TO C
  ONTINUE":GETKEYA$:IFA$<>"C"
  THENRETURN                :REM*82
13Ø DOPEN#1,"DATA FILE.BM"
                            :REM*19Ø
14Ø IFDS=62THENPRINTDS$:DCLOSE:
  PRINT"{2 CRSR DNs}{CTRL 7}P
  RESS ANY KEY":GETKEYA$:RETU
  RN                        :REM*17
15Ø FORX=1TO2Ø4:FORY=1TO5:INPUT
  #1,AR$(X,Y):NEXT:NEXT:DCLOS
  E:FL=1:RETURN             :REM*1Ø9
16Ø REM [F2] SAVE FILE      :REM*13
17Ø PRINTD1$CHR$(27)+"@{CTRL 7}
  SAVE FILE...":IFFL=ØTHENGOS
  UB138Ø:RETURN             :REM*24Ø
18Ø SCRATCH"DATA BACK":RENAME"D
  ATA FILE.BM"TO"DATA BACK"
                            :REM*253 ►
```


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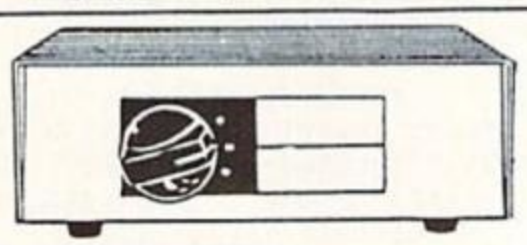

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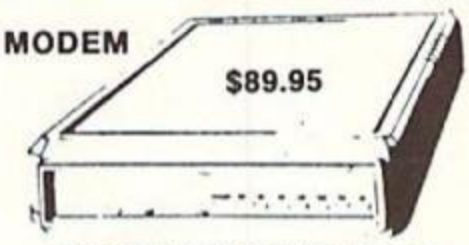

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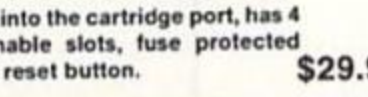

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BILL MINDER

```
19Ø DOPEN#1,"DATA FILE.BM",W
                          :REM*9Ø
2ØØ FORX=1TO2Ø4:FORY=1TO5:PRINT
    #1,AR$(X,Y):NEXT:NEXT:DCLOS
    E:RETURN              :REM*165
21Ø REM [F3] FIND         :REM*24Ø
22Ø PRINTD1$CHR$(27)+"@{CTRL 7}
    FIND...":IFFL=ØTHENGOSUB138
    Ø:RETURN              :REM*121
23Ø PRINT"{CTRL 7}FIND {CTRL 9}
    A{CTRL Ø}MOUNT, {CTRL 9}D{C
    TRL Ø}ATE OR {CTRL 9}C{CTRL
     Ø}HECK #":GETKEYAN$:J=1
                          :REM*155
24Ø INPUT"WHAT IS THE DATA TO S
    EARCH FOR";DT$        :REM*112
25Ø IF J=>2Ø4 THEN PRINTD1$CHR$
    (27)+"@{CTRL 7}{CTRL 9} NOT
     FOUND "              :REM*245
26Ø IF J=>2Ø4 THEN PRINT"{CTRL
    7}{2 CRSR DNs}{CTRL 9} PRES
    S ANY KEY TO CONTINUE ":GET
    KEY A$:RETURN         :REM*53
27Ø IF AN$="A" THEN IF AR$(J,2)
    =DT$ THEN 31Ø         :REM*131
28Ø IF AN$="D" THEN IF AR$(J,3)
    =DT$ THEN 31Ø         :REM*124
29Ø IF AN$="C" THEN IF AR$(J,4)
    =DT$ THEN 31Ø         :REM*64
3ØØ J=J+1:GOTO25Ø         :REM*172
31Ø PRINTD1$CHR$(27)+"@{CTRL 7}
    {4 CRSR DNs}FOUND IN REC #"
    J;                    :REM*195
32Ø PRINTAR$(J,1)"{2 SPACEs}"AR
    $(J,2)"{2 SPACEs}"AR$(J,3)"
    {2 SPACEs}"AR$(J,4)"{2 SPAC
    Es}"AR$(J,5)          :REM*56
33Ø PRINT"{CTRL 7}{3 CRSR DNs}S
    HALL I SEARCH FOR ANOTHER ?
     (Y/N)":GETKEYG$      :REM*96
34Ø IF G$="Y"THEN J=J+1:GOTO 25
    Ø                     :REM*2Ø2
35Ø RETURN                :REM*237
36Ø REM [F4] ENTER        :REM*51
37Ø PG=1:S=1:PRINTD2$CHR$(27)+"
    @ENTER...":IFFL=ØTHENGOSUB1
    38Ø:RETURN            :REM*12
38Ø PRINTD1$"{CTRL 7}{CTRL 9} R
    C{3 SPACEs}ACCOUNT{9 SPACEs
    }AMOUNT{5 SPACEs}DATE{6 SPA
    CEs}CHECK #{1Ø SPACEs}MEMO{
    15 SPACEs}{CTRL 1}" :REM*1Ø
39Ø PRINT"{HOME}{3 CRSR DNs}"MN
    $(PG):PRINTD1$:T=Ø    :REM*69
4ØØ FORJ=STOS+16:GOSUB64Ø:NEXT
                          :REM*2ØØ
41Ø PRINTD2$CHR$(27)+"@{CTRL 7}
    {CTRL 9}N{CTRL Ø}EXT PAGE,
    {CTRL 9}M{CTRL Ø}ENU OR {CT
    RL 9}R{CTRL Ø}ECORD # ?{15
    SPACEs}";             :REM*179
42Ø PRINT TAB(22)"{CTRL 9} TOTA
    L FOR THIS MONTH : $";:PRIN
    TUSING"####.## ";T    :REM*79
43Ø POKE241,Ø:GETKEYAN$:IFAN$="
    N"THEN46Ø             :REM*46
44Ø IF AN$="M" THEN RETURN
                          :REM*12
45Ø IF AN$="R"THEN49Ø:ELSE43Ø
                          :REM*75
46Ø S=S+17:IFS>188THENS=1
                          :REM*36
47Ø PG=PG+1:IFPG=13THENPG=1
                          :REM*172
48Ø FORX=1TO78:WINDOWØ,5,X,24,1
    :NEXT:PRINT"{2 HOMEs}":GOTO
    39Ø:REM STEP2 TO SPEED UP C
    LR                    :REM*143
49Ø PRINT D2$ CHR$(27)+"Q";:INP
    UT"RECORD #";RC:IFRC<SORRC>
    S+16THEN49Ø           :REM*9Ø
5ØØ IFAR$(RC,1)<>"- - -"THEN54Ø
                          :REM*213
51Ø PRINTD2$CHR$(27)+"@";:INPUT
    "NAME";Z$             :REM*155
52Ø IFZ$=""THEN54Ø:ELSEAR$(RC,1
    )=Z$:Z$=""            :REM*14Ø
53Ø IFLEN(AR$(RC,1))>13THENAR$(
    RC,1)=LEFT$(AR$(RC,1),4)
                          :REM*47
54Ø PRINTD2$CHR$(27)+"@";:INPUT
    "AMOUNT (Ø.ØØ)";Z$ :REM*252
55Ø IFZ$=""THEN56Ø:ELSEAR$(RC,2
    )=Z$:Z$=""            :REM*192
56Ø PRINTD2$CHR$(27)+"Q";:INPUT
    "DATE (MM/DD/YY)";Z$
                          :REM*132
57Ø IFZ$=""THEN58Ø:ELSEAR$(RC,3
    )=Z$:Z$=""            :REM*1Ø
58Ø PRINTD2$CHR$(27)+"@";:INPUT
    "CHECK # (XXXX)";Z$ :REM*21
59Ø IFZ$=""THEN6ØØ:ELSEAR$(RC,4
    )=Z$:Z$=""            :REM*226
6ØØ PRINTD2$CHR$(27)+"@";:INPUT
    "MEMO";Z$             :REM*99
61Ø IFZ$=""THEN63Ø:ELSEAR$(RC,5
    )=Z$:Z$=""            :REM*37
62Ø IFLEN(AR$(RC,5))>24THENAR$(
    RC,5)=LEFT$(AR$(RC,5),24)
                          :REM*115
63Ø PRINT D1$ "{CRSR DN}" CHR$(
    27)+"@":PRINTD1$:GOTO39Ø
                          :REM*184
64Ø TB=(27-LEN(AR$(J,2)))
                          :REM*157
65Ø PRINTJ"{CRSR LF}.{2 SPACEs}
    "TAB(6)AR$(J,1)TAB(TB)AR$(J
    ,2);                  :REM*243
66Ø PRINT TAB(31)AR$(J,3)TAB(44
    )AR$(J,4)TAB(53)AR$(J,5):T=
    T+VAL(AR$(J,2)):RETURN
                          :REM*67
67Ø REM [F5] GRAPH        :REM*248
68Ø PRINTD1$CHR$(27)+"@GRAPH...
    {CTRL 1}":IFFL=ØTHENGOSUB13
    8Ø:RETURN             :REM*194
69Ø FORJ=1TO17:PRINTJ"{CRSR LF}
    .{2 SPACEs}"AR$(J,1):NEXT
                          :REM*13
7ØØ CT=Ø:V=Ø:MX=66:D=1.Ø:J=1:A$
    ="{CTRL 9} {CTRL Ø}":REM*15
71Ø INPUT"# OF RECORD TO GRAPH"
    ;N$:N=VAL(N$):N2=N:IFN<1ORN
    >17THEN71Ø            :REM*77
72Ø DO WHILE N=<2Ø4:V=INT(VAL(A
    R$(N,2)))             :REM*1ØØ
73Ø IF V>MX/DTHENT=V:T=(T/D):IF
    T>MXTHEND=D+.1:GOTO73Ø
                          :REM*133
74Ø N=N+17:LOOP           :REM*78
75Ø PRINT D1$ CHR$(27)+"@GRAPH
    OF ";AR$(N2,1):PRINT
                          :REM*1Ø2
76Ø DO WHILE N2=<2Ø4:PRINTLEFT$
    ((MN$(CT+1)),4);      :REM*244
77Ø FOR K=Ø TO (INT(VAL(AR$(N2,
    2)))/D):PRINTA$;:NEXT:PRINT
    AR$(N2,2)             :REM*93
78Ø N2=N2+17:CT=CT+1:LOOP
                          :REM*1Ø9
79Ø PRINT:PRINT"{CTRL 9} PRESS
    ANY KEY ":GETKEYA$:RETURN
                          :REM*134
8ØØ REM [F6] TALLY        :REM*49
81Ø PRINTD1$CHR$(27)+"@TALLY...
    ":IFFL=ØTHENGOSUB138Ø:RETUR
    N                     :REM*34
82Ø T=Ø:T1=Ø:S=1:GT=Ø:F=188:X=1
    :D3$=D1$+"{CRSR DN}"
                          :REM*1Ø4
83Ø FORJ=STOFSTEP17:T=T+VAL(AR$
    (J,2)):T1=T:NEXT      :REM*65
84Ø IFT>ØTHENPRINTD3$AR$(X,1)"=
     $";:PRINTUSING"####.##";T1
    :GT=GT+T1             :REM*1Ø
85Ø IF X<17 THEN S=S+1:X=X+1:F=
    F+1:D3$=D3$+"{CRSR DN}":T1=
    Ø:T=Ø:GOTO 83Ø        :REM*174
86Ø PRINT"GRAND TOTAL = $";:PRI
    NTUSING"#####.##";GT
                          :REM*181
87Ø PRINTD2$CHR$(27)+"@{CTRL 9}
     PRESS ANY KEY {CTRL Ø}":GE
    TKEYA$:RETURN         :REM*21
88Ø REM [F7] PRINT        :REM*18Ø
89Ø PRINTD1$CHR$(27)+"@PRINT...
    ":IFFL=ØTHENGOSUB138Ø:RETUR
    N                     :REM*91
9ØØ PRINT"TURN ON PRINTER AND P
    RESS ANY KEY":GETKEYA$
                          :REM*1Ø6
91Ø OPEN15,4,15:CLOSE15:CT=Ø:J=
    Ø:                    :REM*9Ø
92Ø IF ST<>ØTHENPRINT"PRINTER I
    S NOT ON":SLEEP2:RETURN
                          :REM*21Ø
93Ø PRINT"{CRSR DN}{CTRL 9}1{CT
    RL Ø} = ALL W/DATA":REM*141
94Ø PRINT"{CRSR DN}{CTRL 9}2{CT
    RL Ø} = FLIP & PRINT"
                          :REM*11Ø
95Ø PRINT"{CRSR DN}{CTRL 9}3{CT
    RL Ø} = ONE MONTH" :REM*189
96Ø GETKEYA$:A=VAL(A$):IFA<1ORA
    >3THEN96Ø             :REM*128
97Ø OPEN4,4:ONAGOTO98Ø,1Ø1Ø,1Ø9
    Ø                     :REM*1Ø9
98Ø FORJ=1TO2Ø4:IFAR$(J,2)<>"Ø.
    ØØ"THENGOSUB114Ø      :REM*112
99Ø NEXT                  :REM*1ØØ
1ØØØ GOTO 118Ø            :REM*49
1Ø1Ø J=J+1:PRINTD1$CHR$(27)+"@"
                          :REM*2Ø
1Ø2Ø PRINT TAB(3)"{8 CRSR DNs}R
    ECORD #"J"{CRSR LF}. ";
                          :REM*32
1Ø3Ø PRINT AR$(J,1)"{2 SPACEs}"
```


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BILL MINDER

```
    AR$(J,2)"{2 SPACEs}"AR$(J,
    3)"{2 SPACEs}"AR$(J,4)"{2
    SPACEs}"AR$(J,5)  :REM*236
1040 PRINT TAB(21)"{CRSR DN}{CT
    RL 9}(P)RINT, (N)EXT RECOR
    D OR (E)XIT":GETKEYA$
                          :REM*60
1050 IFA$<>"P"ANDA$<>"N"ANDA$<>
    "E"THEN1020          :REM*110
1060 IFA$="E"THEN1180     :REM*7
1070 IFA$<>"N"THENGOSUB1140
                          :REM*214
1080 IFJ<204 THEN 1010:ELSE1180
                          :REM*198
1090 PRINT D1$ CHR$(27) +"@"
                          :REM*168
1100 FOR J=1 TO 12:PRINTJ"{CRSR
     LF}.{2 SPACEs}"MN$(J):NEX
    T                     :REM*7
1110 INPUT"NUMBER OF MONTH TO P
    RINT";N$:N=VAL(N$):IFN<1OR
    N>12THEN1110          :REM*85
1120 S=(N*17)-16:F=S+16:FORJ=ST
    OF:IFAR$(J,1)<>"- - -"THEN
    GOSUB1140             :REM*136
1130 NEXT:GOSUB1180:RETURN
                          :REM*60
1140 PRINT#4,"---------------["
    ;J;"]---------------"
                          :REM*229
1150 PRINT#4,"ACCOUNT :";AR$(J,
    1):PRINT#4,"AMOUNT :";AR$(
    J,2)                  :REM*130
1160 PRINT#4,"DATE :";AR$(J,3):
    PRINT#4,"CHECK #";AR$(J,4)
                          :REM*168
1170 PRINT#4,"MEMO :";AR$(J,5):
    CT=CT+1:RETURN        :REM*90
1180 PRINT#4,"----------------
    --------------------":PRIN
    T#4                   :REM*27
1190 PRINT#4:PRINT#4:PRINT#4,"T
    OTAL NUMBER OF RECORDS PRI
    NTED :";CT            :REM*184
1200 FORX=1TO5:PRINT#4:NEXT:CLO
    SE4:RETURN            :REM*16
1210 REM [F8] CREATE      :REM*26
1220 PRINTD1$CHR$(27)+"@CREATE.
    .":OPEN1,8,8,"DATA FILE.B
    M,S,W":CLOSE1         :REM*228
1230 IFDS<>63 THEN 1260 :REM*38
1240 PRINT CHR$(34) "DATA FILE.
    BM" CHR$(34)          :REM*153
1250 PRINT"ALREADY ON THIS DISK
    .":PRINT"{CTRL 9} LOAD WIT
    H [F1] ":SLEEP4:RETURN
                          :REM*3
1260 FOR X=1 TO 204:AR$(X,1)="-
     - -":AR$(X,2)="0.00"
                          :REM*161
1270 AR$(X,3)="MM/DD/YY":AR$(X,
    4)="****":AR$(X,5)=">":NEX
    T                     :REM*185
1280 INPUT"{CRSR UP}HOW MANY MO
    NTHLY RECORDS TO KEEP (1-1
    7)";N:IFN<1ORN>17THEN1280
                          :REM*194
1290 FORJ=1TON:PRINT"{CRSR DN}R
    ECORD #";J;:INPUT"NAME OF
    ACCOUNT";AN$          :REM*210
1300 IFLEN(AN$)>16THENAN$=LEFT$
    (AN$),16              :REM*93
1310 FORX=JTO204STEP17:AR$(X,1)
    =AN$:NEXT:NEXT:FL=1:PRINT"
    {HOME}{3 CRSR DNs}"CHR$(27
    )+"@":RETURN          :REM*1
1320 REM SUBROUTINES      :REM*94
1330 COLOR6,4:PRINT"{CTRL 7}{SH
    FT CLR}{4 SPACEs}*{2 SPACE
    s}BILL MINDER 128/80{2 SPA
    CEs}*{2 SPACEs}FROM RUN MA
    GAZINE 1988{2 SPACEs}*{2 S
    PACEs}BY JEROME REUTER{2 S
    PACEs}*{4 SPACEs}"  :REM*20
1340 PRINT"{CTRL 9}{5 SPACEs}[F
    1]{5 SPACEs}[F2]{5 SPACEs}
    [F3]{5 SPACEs}[F4]{6 SPACE
    s}[F5]{6 SPACEs}[F6]{6 SPA
    CEs}[F7]{6 SPACEs}[F8]{4 S
    PACEs}"               :REM*170
1350 PRINT"{CTRL 9}{5 SPACEs}LO
    AD{5 SPACEs}SAVE{5 SPACEs}
    FIND{5 SPACEs}ENTER{5 SPAC
    Es}GRAPH{5 SPACEs}TALLY{5
    SPACEs}PRINT{4 SPACEs}CREA
    TE{3 SPACEs}{CTRL 1}"
                          :REM*23
1360 PR$=" {CTRL 9}{SHFT LB.} M
    AKE YOUR SELECTION {CTRL 0
    }{SHFT LB.} ":PL$="{CTRL 7
    } {COMD *}{CTRL 9} MAKE YO
    UR SELECTION {COMD *}{CTRL
     0} "                 :REM*91
1370 P$=" {CTRL 9} MAKE YOUR SE
    LECTION {CTRL 0} ":RETURN
                          :REM*44
1380 CHAR0,28,14," NO FILE EXIS
    TS ",1:SLEEP2:RETURN
                          :REM*22
1390 PRINTD1$CHR$(27)+"@QUIT...
    ":PRINT"{3 CRSR DNs} ARE Y
    OU SURE (Y/N)":GETKEYA$
                          :REM*98
1400 IFA$<>"Y"THEN50      :REM*101
1410 FORJ=1TO78:WINDOW0,0,J+1,2
    4,1:NEXT:PRINT"{2 HOMEs}":
    END                   :REM*23
1420 PRINTD2$CHR$(27)+"@"
                          :REM*31
1430 FORJ=35TO15STEP-1:PRINTD2$
    TAB(J)PL$:NEXT        :REM*241
1440 FORJ=15TO35:PRINTD2$TAB(J)
    PR$:NEXT              :REM*22
1450 FORJ=35TO25STEP-1:PRINTD2$
    TAB(J)PL$:NEXT        :REM*214
1460 PRINTD2$TAB(26)"{CTRL G}"P
    $:RETURN              :REM*59
1470 DATA "JAN - PAGE 01","FEB
    - PAGE 02","MAR - PAGE 03"
    ,"APR - PAGE 04","MAY - PA
    GE 05","JUN - PAGE 06"
                          :REM*21
1480 DATA "JUL - PAGE 07","AUG
    - PAGE 08","SEP - PAGE 09"
    ,"OCT - PAGE 10","NOV - PA
    GE 11","DEC - PAGE 12"
                          :REM*17
```

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Travel Tally

The next time you take a business trip, don't leave home without Travel Expense Diary.

By KENNY LAWSON

Travel Expense Diary is a simple C-64 database-type program for keeping a computerized record of expenses on business trips. All you need to do is enter the amounts you spend each day in the ten expense categories the program provides—hotels, dining, entertainment, transportation, and so on. If you want, you can change the categories in the Data statements to suit your own needs.

Type in Listing 1, using *RUN*'s new checksum program, and save a copy to disk. For those who are interested in programming, the Data statements in lines 2210–2260 constitute a machine language routine that saves and restores text screens.

Making Entries

The first time you run Travel Expense Diary, line 220 creates a dummy sequential disk file named Expense.Sq. Then the main menu, with six options, appears on the screen. If you've used the program before and already have an Expense.Sq file, you press 1 at this point to load it and read in the latest totals. If you don't have a previous file, press 3, and the data-entry screen appears, showing the ten categories available. Use the cursor-up-and-down key to highlight to the category you want; then press the return key.

The return brings up a 3-D-effect window that prompts you to enter an amount. Only the return key, the number keys and the period (decimal point) are acceptable input here. If you press any other key, a warning sounds and a second 3-D window pops up, telling you to reenter your data.

The way to correct mistakes in your numeric input is to make an intentional invalid entry. For instance, say you press 6 when you mean 7; just press any letter key to access the reentry window. Pressing return with no input bypasses the entry of an amount into a category.

Once you've typed an amount, press return to add it to the previous total and restore the data-entry screen. Now you can either use the cursor and return keys to select another category or press M to go to the main menu. When you press M, each category into which you entered some amount will be automatically updated with a new total.

After returning to the menu, you might want to press 5 to see your totals on-screen or 4 to draw a colorful bar chart displaying the distribution pattern of your expenses. From option 4, you can also print out a hard copy of the bar chart, accompanied by a list of category totals and the grand total.

Program Notes

I've written several error traps into Travel Expense Diary. First, each disk input/output operation is checked, and any error is reported on-screen. Also, numeric data input is severely limited. In addition, if you've entered amounts into any categories, but haven't saved the file, the program reminds you of that fact before you exit. Then you can go ahead and exit, or go back to the menu to save the file first. In either case, when you press 6, the program asks if you're sure you want to quit.

As a final precaution, saves are done under a new filename, Bus.Seq.Del, so your old data is retained in Expense.Sq as insurance. If you accidentally save the file prematurely or make a mistake, all you have to do is exit the program, and, in Immediate mode, type in:

```
OPEN15,8,15,"S0:EXPENSE.SQ":CLOSE15
```

Then, after the light on the disk drive goes out, type in:

```
OPEN15,8,15,"R0:EXPENSE.SQ
=BUS.SEQ.DEL":CLOSE15
```

In effect, this replaces the suspect file with the file that existed before the save. Finally, type RUN to proceed normally.

Travel Expense Diary is written in Basic and occupies 7554 bytes of memory. You can customize it to suit other purposes by replacing the ten category names in the Data lines and changing the filenames where appropriate. R

Kenny Lawson uses computer-controlled equipment at work and enjoys telecomputing and writing Commodore programs at home.

Listing 1. Travel Expense Diary program.

```
10 REM BUSINESS TRIP BY KENNY L
   AWSON                    :REM*210
20 FORX=1TO10:READA$:CN$(X)=A$:
   NEXT                     :REM*93
30 FORX=828TO935:READA:POKEX,A:
   NEXT                     :REM*12
40 W1$="{CTRL 7}{CTRL 9}{29 SPA
   CEs}":W2$=W1$+"{CTRL 9}{CTRL
    1} "                    :REM*106
50 W3$="{CTRL 1}"+RIGHT$(W1$,30
   ):MM$="{3 SPACEs}"+CHR$(18)+
   CHR$(129)+MID$(W1$,3,18)+"{C
   TRL 0}{3 SPACEs}"        :REM*165
60 W4$="{CTRL 5}{CTRL 9}{21 SPA
   CEs}":W5$=W4$+"{CTRL 9}{CTRL
    1} ":DY=0:FI$="EXPENSE.SQ"
                            :REM*57
70 W6$=LEFT$(W3$,23):CH$="{CTRL
    9}{CRSR RT}CHOOSE{CRSR RT}A
   N{CRSR RT}OPTION":SV=0:DIMZ$
   (23)                     :REM*179
80 FORX=1TO10:FORC=1TO16-LEN(CN
   $(X)):CN$(X)=CN$(X)+CHR$(32)
   :NEXTC                   :REM*201 ►
```

RUN it right: **C-64; printer optional**

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TRAVEL TALLY

```
9Ø CN$(X)=CHR$(32)+CN$(X):NEXTX
   :DL$="{31 COMD @s}" :REM*216
1ØØ L1$="{2 COMD Ps}{CTRL Ø}":L
   2$="{2 COMD Os}{CTRL Ø}":L3
   $="{2 COMD Is}{CTRL Ø}":L4$
   ="{CTRL 9}{2 COMD Us}{CTRL
   Ø}":L5$="{CTRL 9}{2 COMD Ys
   }{CTRL Ø}"          :REM*235
11Ø BC$="{CTRL 9}{2 SPACEs}{CTR
   L Ø}{CRSR UP}{2 CRSR LFs}":
   TA$="{21 SPACEs}"   :REM*9Ø
12Ø TA(1)=9:FORX=2TO1Ø:TA(X)=TA
   (X-1)+3:NEXT        :REM*46
13Ø CO$(1)="{CTRL 3}":CO$(2)="{
   CTRL 5}":CO$(3)="{CTRL 6}":
   CO$(4)="{CTRL 7}":CO$(5)="{
   COMD 7}"            :REM*129
14Ø CO$(6)="{COMD 1}":CO$(7)="{
   COMD 2}":CO$(8)="{COMD 6}":
   CO$(9)="{COMD 3}":CO$(1Ø)="
   {COMD 4}"           :REM*1Ø1
15Ø OPEN15,8,15:OPEN8,8,8,FI$+"
   ,S,R":INPUT#15,ER$:BB$="Ø":
   ED=Ø                :REM*12
16Ø IFVAL(ER$)<19THENCLOSE8:CLO
   SE15:GOTO19Ø        :REM*179
17Ø PRINT#15,"UJ":FORX=1TO2ØØØ:
   NEXT:CLOSE15        :REM*113
18Ø CLOSE8:OPEN8,8,8,FI$+",S,W"
   :FORX=1TO1Ø:PRINT#8,BB$:NEX
   T:CLOSE8:CLOSE15    :REM*83
19Ø PRINTCHR$(3Ø)CHR$(147):POKE
   5328Ø,15:POKE53281,15
                       :REM*252
2ØØ PRINT"{HOME}{COMD 1}{SHFT O
   }{COMD H}"TAB(37)"{COMD N}{
   SHFT P}"            :REM*88
21Ø PRINT"{SHFT P}{37 COMD Ys}{
   SHFT O}"            :REM*2Ø4
22Ø FORX=1TO2Ø:PRINT"{COMD M}"T
   AB(38)"{COMD H}":NEXT
                       :REM*33
23Ø PRINT"{SHFT @}{37 COMD Ps}{
   SHFT L}"            :REM*245
24Ø PRINT"{SHFT L}{COMD H}"TAB(
   37)"{COMD N}{SHFT @}";
                       :REM*127
25Ø PRINTCHR$(19):PRINT:PRINT:P
   RINT"{COMD 1}{4 CRSR RTs}{C
   TRL 9}BUSINESS DIARY AND EX
   PENSE CHART{2 CRSR DNs}"
                       :REM*129
26Ø PRINTTAB(8)MM$:PRINTTAB(8)"
   {3 SPACEs}{CTRL 9}{4 SPACEs
   }MAIN{2 SPACEs}MENU{4 SPACE
   s}{CTRL Ø}{3 SPACEs}"
                       :REM*18
27Ø FORX=1TO2:PRINTTAB(8)MM$:NE
   XT:PRINTTAB(8)"{3 SPACEs}{C
   TRL 9} 1. LOAD THE FILE {CT
   RL Ø}{3 SPACEs}"    :REM*191
28Ø PRINTTAB(8)"{3 SPACEs}{CTRL
    9} 2. SAVE THE FILE {CTRL
   Ø}{3 SPACEs}"       :REM*238
29Ø PRINTTAB(8)"{3 SPACEs}{CTRL
    9} 3. ENTER AMOUNTS {CTRL
   Ø}{3 SPACEs}"       :REM*33
3ØØ PRINTTAB(8)"{3 SPACEs}{CTRL
    9} 4. SEE BAR CHART {CTRL
   Ø}{3 SPACEs}"       :REM*2Ø1
31Ø PRINTTAB(8)"{3 SPACEs}{CTRL
    9} 5. CHECK TOTALS{2 SPACE
   s}{CTRL Ø}{3 SPACEs}"
                       :REM*35
32Ø PRINTTAB(8)"{3 SPACEs}{CTRL
    9} 6. EXIT PROGRAM{2 SPACE
   s}{CTRL Ø}{3 SPACEs}"
                       :REM*122
33Ø FORX=1TO4:PRINTTAB(8)MM$:NE
   XT:PRINT"{3 CRSR UPs}"
                       :REM*2Ø1
34Ø PRINTTAB(11)CH$:GETA$
                       :REM*198
35Ø IFA$<>""THEN37Ø    :REM*29
36Ø FORX=1TO3ØØ:NEXT:PRINT"{2 C
   RSR UPs}":PRINTTAB(8)MM$"{C
   RSR UP}":FORX=1TO3ØØ:NEXT:G
   OTO34Ø              :REM*16Ø
37Ø A=VAL(A$):IFA<1ORA>6THEN36Ø
                       :REM*1Ø1
38Ø ONAGOTO69Ø,79Ø,4ØØ,11ØØ,156
   Ø,167Ø              :REM*89
39Ø REM GET CATEGORY INPUTS
                       :REM*131
4ØØ POKE5328Ø,14:POKE53281,14:P
   RINTCHR$(159)CHR$(147)CHR$(
   17)                 :REM*27
41Ø A$=CHR$(18)+CHR$(32):PRINTT
   AB(11);:FORX=1TO19:PRINTA$;
   :NEXT:PRINT         :REM*218
42Ø FORX=1TO21:PRINTTAB(11)A$SP
   C(17)A$:NEXT        :REM*5
43Ø PRINTTAB(11);:FORX=1TO19:PR
   INTA$;:NEXT:PRINTCHR$(19):F
   ORX=1TO3:PRINT:NEXT:REM*184
44Ø FORX=1TO1Ø:PRINTTAB(12)CN$(
   X)CHR$(17):NEXT     :REM*252
45Ø PRINT"{HOME}{3 CRSR DNs}":P
   RINTTAB(12)CHR$(18)CN$(1)
                       :REM*61
46Ø PRINT"{HOME}{3 CRSR DNs}"TA
   B(32)"USE THE{CRSR DN}"
                       :REM*251
47Ø PRINT" BUSINESS"TAB(32)"CUR
   SOR{CRSR DN}":PRINT"{2 SPAC
   Es}DIARY"TAB(32)"KEYS TO{CR
   SR DN}"             :REM*79
48Ø PRINT"{3 SPACEs}AND"TAB(32)
   "MOVE{CRSR DN}":PRINT" EXPE
   NSE":PRINTTAB(32)"RETURN"
                       :REM*118
49Ø PRINT"{2 SPACEs}CHART":PRIN
   TTAB(34)"TO{CRSR DN}":PRINT
   TAB(32)"SELECT{2 CRSR DNs}"
                       :REM*43
5ØØ PRINTTAB(32)"<M> FOR{CRSR D
   N}":PRINTTAB(33)"MENU":POKE
   214,3:PRINT         :REM*131
51Ø GETA$:IFA$=""THEN51Ø
                       :REM*17Ø
52Ø IFA$="M"THEN19Ø    :REM*254
53Ø IFA$<>CHR$(17)THEN59Ø
                       :REM*238
54Ø GOSUB87Ø:IFCN=1ØTHEN57Ø
                       :REM*157
55Ø PRINT:PRINTCHR$(145)TAB(12)
   CN$(CN)CHR$(17)     :REM*2Ø1
56Ø PRINTTAB(12)CHR$(18)CN$(CN+
   1);:GOTO51Ø         :REM*58
57Ø PRINT:PRINTCHR$(145)TAB(12)
   CN$(CN):POKE214,3:PRINT:PRI
   NTTAB(12)"{CTRL 9}"CN$(1);
                       :REM*219
58Ø GOTO51Ø            :REM*142
59Ø IFA$<>CHR$(145)THEN65Ø
                       :REM*1ØØ
6ØØ GOSUB87Ø:IFCN=1THEN63Ø
                       :REM*95
61Ø PRINT:PRINTCHR$(145)TAB(12)
   CN$(CN):POKE214,SN-3:PRINT
                       :REM*5Ø
62Ø PRINTTAB(12)CHR$(18)CN$(CN-
   1);:GOTO51Ø         :REM*233
63Ø PRINT:PRINTCHR$(145)TAB(12)
   CN$(1):POKE214,21:PRINT
                       :REM*11Ø
64Ø PRINTTAB(12)CHR$(18)CN$(1Ø)
   ;:GOTO51Ø           :REM*2Ø3
65Ø IFA$<>CHR$(13)THEN51Ø
                       :REM*154
66Ø GOSUB87Ø:RO=PEEK(214):SYS82
   8:REM SAVE SCREEN   :REM*97
67Ø GOSUB98Ø:REM INPUT ROUTINE
                       :REM*132
68Ø GOTO51Ø            :REM*234
69Ø REM LOAD FILE      :REM*129
7ØØ GOSUB77Ø:REM DRAW WINDOW
                       :REM*183
71Ø PRINTTAB(9)"{CTRL 5}{CTRL 9
   }{CRSR UP}{CRSR RT}LOADING{
   2 CRSR RTs}"FI$:GOSUB141Ø:R
   EM READ DISK STATUS:REM*133
72Ø CLOSE8:OPEN8,8,8,"EXPENSE.S
   Q,S,R"              :REM*169
73Ø FORX=1TO1Ø:INPUT#8,CS$(X):C
   N(X)=VAL(CS$(X)):NEXT:CLOSE
   8                   :REM*111
74Ø FORX=1TO1Ø:IFCN(X)<>ØTHENDY
   =1                  :REM*64
75Ø NEXT               :REM*115
76Ø GOSUB141Ø:GOTO25Ø  :REM*143
77Ø PRINT"{HOME}{1Ø CRSR DNs}":
   PRINTTAB(9)W4$:FORX=1TO3:PR
   INTTAB(9)W5$:NEXT   :REM*24
78Ø PRINTTAB(1Ø)W6$"{4 CRSR UPs
   }":RETURN           :REM*36
79Ø REM SAVE FILE      :REM*63
8ØØ OPEN15,8,15,"SØ:BUS.SEQ.DEL
   "                   :REM*193
81Ø GOSUB77Ø:PRINTTAB(1Ø)"{CTRL
    9}{CTRL 5}{CRSR UP}SAVING{
   2 CRSR RTs}"FI$     :REM*76
82Ø GOSUB141Ø:OPEN15,8,15,"RØ:B
   US.SEQ.DEL="+FI$    :REM*78
83Ø GOSUB141Ø:OPEN15,8,15,"SØ:"
   +FI$                :REM*2Ø9
84Ø GOSUB141Ø:CLOSE8:OPEN8,8,8,
   FI$+",S,W"          :REM*132
85Ø FORX=1TO1Ø:CS$(X)=STR$(CN(X
   )):PRINT#8,CS$(X):NEXT
                       :REM*169
86Ø GOSUB141Ø:SV=1:GOTO25Ø
                       :REM*1ØØ
87Ø REM CHECK PEEK     :REM*56
88Ø SN=PEEK(214):IFSN=4THENCN=1
   :RETURN             :REM*116
89Ø IFSN=6THENCN=2:RETURN
```


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```
                                :REM*212
9ØØ IFSN=8THENCN=3 RETURN
                                :REM*55
91Ø IFSN=1ØTHENCN=4:RETURN
                                :REM*44
92Ø IFSN=12THENCN=5:RETURN
                                :REM*11
93Ø IFSN=14THENCN=6:RETURN
                                :REM*1Ø6
94Ø IFSN=16THENCN=7:RETURN
                                :REM*73
95Ø IFSN=18THENCN=8:RETURN
                                :REM*168
96Ø IFSN=2ØTHENCN=9:RETURN
                                :REM*94
97Ø CN=1Ø:RETURN                :REM*188
98Ø REM INPUT ROUTINE           :REM*39
99Ø GOSUB147Ø:TP$="":PRINTCHR$(
    31);                        :REM*216
1ØØØ POKE2Ø4,Ø:GETD$:IFD$=""THE
    N1ØØØ                       :REM*83
1Ø1Ø IFD$="."THEN1Ø5Ø           :REM*37
1Ø2Ø IFD$=CHR$(13)THEN1Ø5Ø
                                :REM*137
1Ø3Ø IFD$>"/"ANDD$<":"THEN1Ø5Ø
                                :REM*144
1Ø4Ø WAIT2Ø7,1:POKE2Ø4,1:GOSUB1
    79Ø:GOSUB151Ø:GOTO99Ø
                                :REM*156
1Ø5Ø IFD$<>CHR$(13)THENTP$=TP$+
    D$:PRINTD$;:GOTO1ØØØ
                                :REM*1Ø4
1Ø6Ø WAIT2Ø7,1:POKE2Ø4,1:REM*88
1Ø7Ø CN(CN)=CN(CN)+VAL(TP$):PRI
    NTCHR$(159):IFCN(CN)<>ØTHE
    NDY=1                       :REM*65
1Ø8Ø SYS882:POKE214,RO-1:PRINT:
    IFTP$<>""THENED=1           :REM*124
1Ø9Ø RETURN                     :REM*212
11ØØ REM DRAW BAR CHART         :REM*26
111Ø IFDYTHEN114Ø               :REM*25
112Ø GOSUB179Ø:GOSUB77Ø:PRINTTA
    B(9)"{CTRL 9}{CTRL 5}NO DA
    TA IN CATEGORIES"           :REM*97
113Ø FORX=1TO2ØØØ:NEXT:GOTO25Ø
                                :REM*152
114Ø POKE5328Ø,Ø:POKE53281,Ø:PR
    INTCHR$(3Ø)CHR$(147);
                                :REM*145
115Ø HI=Ø:FORX=1TO1Ø:IFCN(X)>HI
    THENHI=INT(CN(X))           :REM*8
116Ø NEXT                       :REM*15
117Ø IFHI/2Ø<>INT(HI/2Ø)THENHI=
    HI+1:GOTO117Ø               :REM*55
118Ø IN=INT(HI/2Ø):SA=HI-IN
                                :REM*51
119Ø FORX=SATOØSTEP-IN:PRINT"$
    "X;TAB(8)DL$:NEXT           :REM*214
12ØØ PRINTTAB(9)"D{2 SPACEs}E{2
     SPACEs}H{2 SPACEs}M{2 SPA
    CEs}P{2 SPACEs}S{2 SPACEs}
    T{2 SPACEs}G{2 SPACEs}T{2
    SPACEs}V"                   :REM*251
121Ø PRINT"CATEGORY I{2 SPACEs}
    N{2 SPACEs}T{2 SPACEs}S{2
    SPACEs}H{2 SPACEs}U{2 SPAC
    Es}A{2 SPACEs}R{2 SPACEs}R
    {2 SPACEs}M"                :REM*249
```

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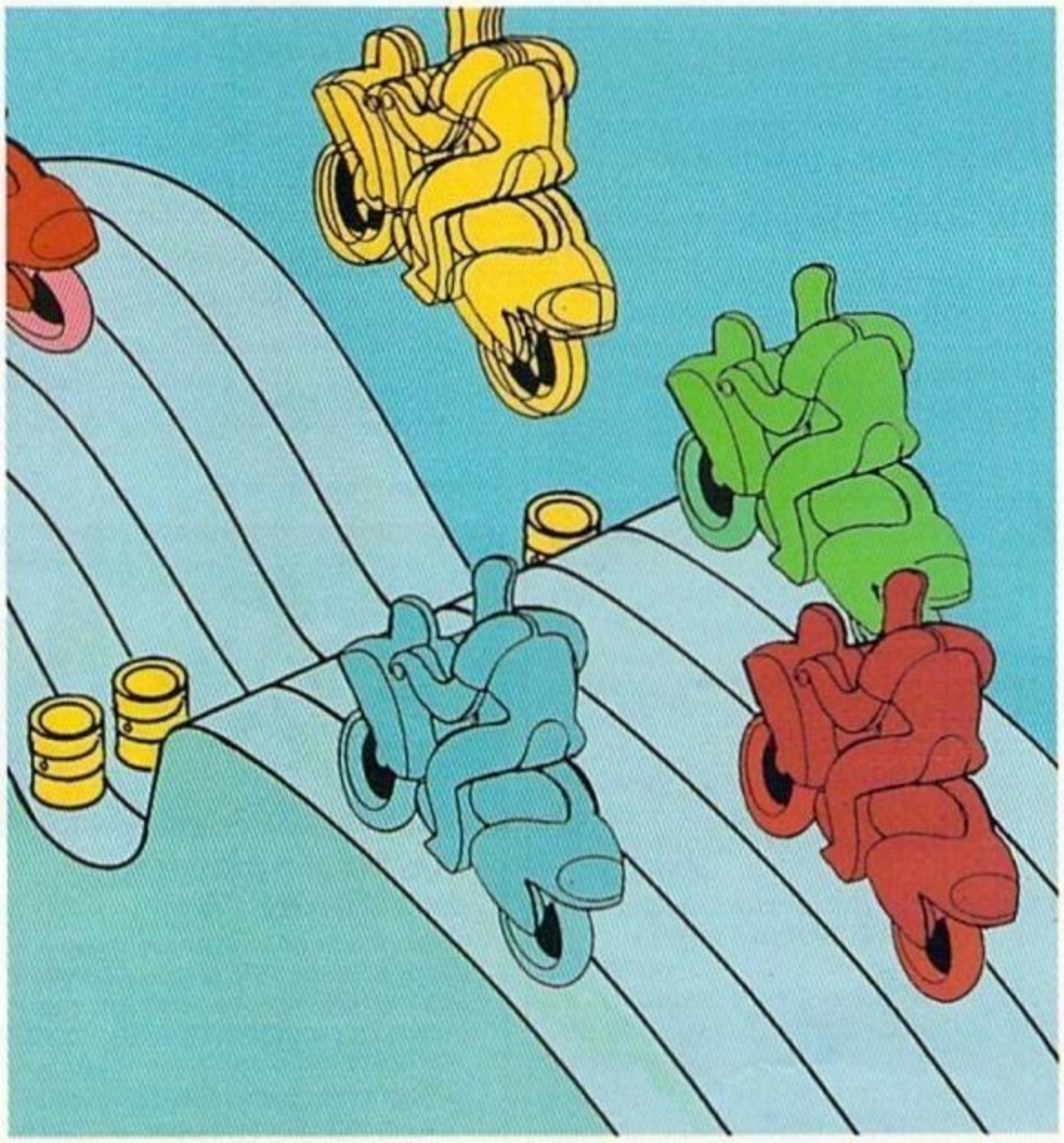
Type in Listing 1 and save it to disk before running it. When you run it, a motorcycle appears in the upper-left corner of the screen. If you have a joystick in port two, press the fire-button to accelerate; otherwise, press the space bar. To slow down, release the fire-button or space bar.

The speed at which you hit the launch ramp determines whether you'll clear the five barrels. If you're going too slowly, you'll fall short and crash; if you're going too fast, you'll overshoot and crash. Lose your concentration for any reason and you'll crash.

Eventually, you'll clear all five barrels and make a perfect landing. Then you can attempt six, seven and even more barrels, until you reach the ultimate jump—a 19-barrel grand finale. You get three motorcycles to start with and a fourth once you successfully clear the 19 barrels.

So, ladies and gentlemen, start your engines! R

Curtis F. Kaylor is a university student majoring in computer science and writing.



Listing 1. Stunt Cycle program.

```
Ø REM STUNT CYCLE - CURTIS F. K
  AYLOR                    :REM*231
1Ø POKE 53281,1:POKE 5328Ø,1:PR
   INT "{SHFT CLR}{CTRL 1}STUNT
    CYCLE":FOR X=832 TO 1Ø22
                            :REM*136
2Ø READ A:POKE X,A:NEXT:FOR X=5
   4272 TO 54296:READ A:POKE X,
   A:NEXT                   :REM*6Ø
3Ø A$="{6 CRSR DNs}{COMD 8}{4Ø
   COMD Us}":R$="{COMD 1}{SHFT
   W}{CTRL 9}{COMD 7}{COMD Y}{C
   TRL Ø}{COMD I}{COMD P}"
                            :REM*181
4Ø PRINT "{SHFT CLR}{CTRL 9}{CT
   RL 7}{4 SPACEs}STUNT CYCLE{3
    SPACEs}BY CURTIS F KAYLOR{4
    SPACEs}{CTRL Ø}{2 CRSR DNs}
   ";A$;A$;A$;              :REM*123
5Ø PRINT "{CTRL 6}LEVEL:{7 SPAC
   Es}BARRELS:{6 SPACEs}CYCLES:
   {3 CRSR UPs}":PRINT "{COMD 7
   }{3 SPACEs}{COMD P}{COMD I}{
   CTRL 9}{COMD Y}{CTRL Ø}{CTRL
    3}{5 SHFT Ws}{HOME}"
                            :REM*1Ø9
6Ø V=53248:S=54272:BR=5:LV=1:CY ►
```

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STUNT CYCLE

```
   =3:POKE V+21,1:POKE V+39,Ø:P
   OKE V+27,1            :REM*131
7Ø POKE S+4,65:POKE 214,22:PRIN
   T:PRINT TAB(46);"{CTRL 6}";L
   V;TAB(61);BR;"{CRSR LF} ";TA
   B(74);                :REM*129
8Ø PRINT CY;"{CRSR LF} {3 CRSR
   UPs}":PRINT TAB(5+BR);R$;"{H
   OME}":SP=Ø:FOR Y=1Ø1 TO 157
   STEP 56               :REM*1Ø4
9Ø POKE V+1,Y:FOR X=Ø TO 34Ø:GE
   T A$:A=(PEEK(2Ø3)<>64 OR (PE
   EK(56464)AND16)=Ø)  :REM*221
1ØØ SP=SP-.1-.3*A:SP=-SP*(SP>Ø
    AND SP<15)-15*(SP>=15)
                         :REM*6Ø
11Ø POKE 2Ø4Ø,13-A:X=X+SP:POKE
    S,SP*16:GOSUB 16Ø:POKE V+21
    ,1:NEXT X,Y          :REM*195
12Ø SP=SP-(SP=Ø):POKE V+1,213:P
    OKE 2Ø4Ø,14:FOR X=Ø TO 36 S
    TEP SP/6:GOSUB 16Ø :REM*1Ø8
13Ø NEXT:FOR XX=Ø TO 24 STEP SP
    /3:X=XX+37:GOSUB 16Ø:POKE V
    +1,213-XX/4:NEXT    :REM*165
14Ø MY=SP-4:MY=-MY*(MY>Ø):FOR Y
    =-MY TO MY STEP MY/1Ø:X=61+
    (MY+Y)*8:GOSUB 16Ø :REM*126
15Ø POKE V+1,2Ø7-MY+ABS(Y):NEXT
    :ON 1-(X>65+8*BR AND X<89+8
    *BR-LV) GOTO 21Ø,18Ø:REM*11
16Ø POKE V,XAND255:POKE V+16,X/
    256:RETURN           :REM*226
17Ø GET A$:ON -(A$="" AND (PEEK
    (56464)AND16)=16) GOTO 17Ø:
    RETURN               :REM*168
18Ø POKE V+1,213:POKE 2Ø4Ø,13:F
    OR X=X TO 34Ø:GOSUB 16Ø:NEX
    T:POKE S+4,64        :REM*117
19Ø BR=BR+1+15*(BR=19):LV=LV+(B
    R=1):IF BR>5 GOTO{2 SPACEs}
    7Ø                   :REM*247
2ØØ CY=CY+1:POKE 214,21:PRINT:P
    RINT TAB(11);"{24 SPACEs}":
    GOTO 7Ø              :REM*49
21Ø POKE V+1,213:POKE 2Ø4Ø,15:P
    OKE S+11,129:POKE S+11,128:
    CY=CY-1              :REM*2Ø6
22Ø POKE S,Ø:FOR X=X TO 34Ø:GOS
    UB 16Ø:NEXT:POKE S+4,64
                         :REM*138
23Ø ON SGN(CY) GOTO 7Ø:PRINT "{
    HOME}{CTRL 5}";TAB(95);"GAM
    E{2 SPACEs}OVER"   :REM*233
24Ø PRINT TAB(12);"{CTRL 3}PLAY
     AGAIN? (Y/N)":GOSUB 17Ø:IF
     A$<>"N" THEN CLR:GOTO 3Ø
                         :REM*84
25Ø DATA ,,,,,,,,,,,,,,,,,,,,,,
    6,,,6,,,,,,12,,,3Ø,,,25,192
    ,,24,56,,255,224,3,69
                        :REM*138
26Ø DATA 88,4,133,164,9,74,82,9
    ,252,66,4,128,36,3,,24,199,
    ,,,,,,,,,,,,1,128,,1
                        :REM*132
27Ø DATA 128,,,4,,3,11,,3,244,1
    28,3,3Ø,64,3,184,64,,212,12
    8,,211,,1,8Ø,,1,32,,3
                         :REM*21
28Ø DATA 64,,5,128,,9,64,,8,64,
    ,4,128,,3,,,199,,,,,,,,,,,,
    ,,,,,,,,,,,,,,,,,,,:REM*36
29Ø DATA 96,,1ØØ,144,,1Ø5,8,,17
    ,72,7,224,144,,255,96,3,254
    ,,5,178,,9,255,128,4
                        :REM*163
3ØØ DATA 176,192,3,24,192,,1,,7
    ,64,,24Ø,32,3,,,128,,252,,,
    ,,,,,,,,15           :REM*99
```

■

TYPE-IN TROUBLES?

Troubleshooting tips for entering listings.

YOU HAVE TYPED IN A *RUN* PROGRAM and are having some problems getting it to run. After a while, you feel like calling for help, but since we're not next door, it's expensive to call us. But we can share our experiences with you. Having heard from many users over the years about their difficulties with typing in listings, we've identified a few recurring problems that plague many people but are easy to fix. So read on and see if your problem is one of these. If so, perhaps the answers will help you find and correct the difficulty.

● You get an Out of Data in Line xxx message. This means that a program line was reading from Data statements and reached the end of the data before it was done reading. There are two possible problems.

One might be with the line that reads the data, usually a For . . . Next loop. Make sure you have the proper values for the loop, because if the listing has a loop of 0 to 150 and you've typed 0 to 160, you'll get the "Out of Data" message. If the loop is correct, then the problem lies in the Data statements themselves. One possibility is that you omitted a whole line of data. That's easy enough to find and correct. More likely, you may have skipped one or more individual data items or typed in a period instead of a comma, which causes two data values to be read as one number. Check your typing carefully against the listing.

● You get an Illegal Quantity Error in Line xxx. That means that you've read a number from a Data statement and tried to Poke it into a memory address. The error occurs because the number is larger than 255 (the largest value a memory address can contain), which means that somewhere in your Data statements you've made an error by typing in a number larger than 255. Again, this is easy to check for and correct. Just look in your Data statements for a number larger than 255. You might have added an extra digit, or perhaps you ran two numbers together (23456 instead of 234,56).

● You get a Syntax Error in Line xxx. This could be almost anything. What it tells you is that there is something wrong in the indicated line. Usually you've misspelled a Basic keyword or omitted some required character. List the line and examine it carefully.

● You get an Error in Data message. This occurs in programs that add up all the data as read, and, when finished, compares that sum with what it should be if all the data were typed in correctly. If it isn't the same, it means an error somewhere in typing the Data statements. Go back and check the data carefully, correct the mistake(s), save the new version and try again.

Finally, we urge everyone who intends to type in one of our listings to use *RUN*'s Checksum program, which is printed in each issue. This nifty little program will help you avoid every mistake we mentioned above, except that it won't detect the omission of a line. ■

—LOU WALLACE

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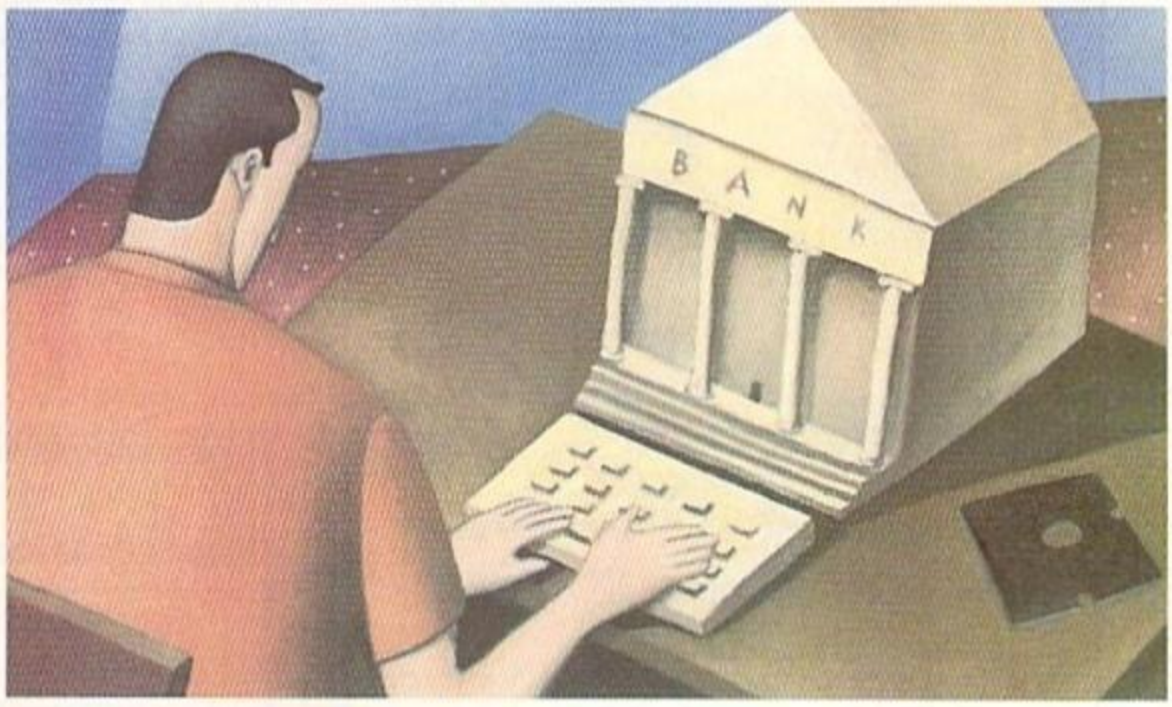
Loan Analysis

You're not a loan when you make use of this interest and principal calculator.

By LOU WALLACE



A home and an automobile are probably the largest purchases you'll ever make, and the chances are that you'll take out loans to finance them. When contemplating such a loan, it's important to know just what your monthly payments will be and how each installment will be divided between principal and interest. Loan Analysis, a C-64 and C-128 version of a standard loan analysis program, will produce such figures for any loan with a repayment period of at least one year.

Type in Listing 1 and save it to disk. When it's run, the program asks for the loan principal (amount borrowed), the interest rate and the term of the loan (how many years you'll be paying it back). It also asks for which year of the loan you'd like to see month-by-month figures and whether you want the output to go to the screen or the printer. When specifying the year, input 1 for the first, 2 for the second, and so on, not 1988 or 1989.

The output includes the amount of the monthly payments, a recap of the loan data you typed in and a table showing how much of each payment will go toward principal and how much toward interest during the year you requested, as well as the balance outstanding after each payment. Below the table you'll see the payment total for the year, along with how much of that total is principal and how much is interest. R

Lou Wallace, RUN's *technical manager, keeps one eye on Commodore matters and the other on the Peterborough housing market.*

Listing 1. Loan Analysis program.

```
10 REM LOAN ANALYSIS    :REM*169
20 PY=12:PRINTCHR$(14)  :REM*63
30 GOSUB 560            :REM*117
40 PRINT                :REM*193
50 PRINT"{SHFT W}HAT YEAR ARE Y
   OU INTERESTED IN";:INPUT YE$
   :YE=VAL(YE$)         :REM*230
60 PRINT:PRINT"{SHFT P}RINT TO
   SCREEN OR PRINTER? (S/P)"
                        :REM*167
70 GET KE$:IF KE$="" THEN 70
                        :REM*45
80 IF KE$<>"P" AND KE$<>"S" THE
   N 70                 :REM*84
90 IF KE$="P" THEN SF=1:GOTO 14
   0                    :REM*93
100 PRINT:PRINT "40 OR 80 COLUM
    N SCREEN? (4/8)"    :REM*233
110 GET S$:IF S$="" THEN 110
                        :REM*69
120 IF S$<>"4" AND S$<>"8" THEN
     110                :REM*101
130 SF=0:IF S$="8" THEN SF=1
                        :REM*33
140 FOR L=0 TO 3:SP(L)=10:NEXT
                        :REM*88
150 IF SF=0 THEN SP(0)=7:SP(1)=
    11:SP(2)=11:SP(3)=10
                        :REM*155
160 PRINT:PRINT         :REM*123
170 GOSUB 610           :REM*244
180 N=PY*YE-PY          :REM*166
190 GOSUB 650           :REM*21
200 PP=INT(P*100)/100:P$=STR$(P
    P)                  :REM*114
210 IF KE$="P" THEN OPEN 4,4,7:
    CMD4                :REM*6
220 P$=RIGHT$(P$,LEN(P$)-1)
                        :REM*49
230 PRINT:PRINT"{SHFT Y}OUR MON
    THLY PAYMENT IS $";P$;"."
                        :REM*118
240 PRINT:PRINT"{SHFT T}HE PRIN
    CIPAL, OR AMOUNT OF YOUR LO
    AN,IS $";AM$;"."    :REM*173
250 PRINT:PRINT"{SHFT T}HE INTE
    REST RATE IS ";IN$;"%."
                        :REM*207
260 PRINT:PRINT"{SHFT T}HE TERM
     OF THE LOAN IS ";YR$;" YEA
    RS."                :REM*18
```

RUN it right: **C-64; C-128 (in 40- or 80-Column mode)**

ILLUSTRATED BY JAMES KACZMAN

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```
27Ø PRINT:PRINT"{SHFT T}HE PAYM
    ENT SCHEDULE FOR YEAR ";YE$
    ;" FOLLOWS:":PRINT :REM*2ØØ
28Ø IF SF=1 THEN 32Ø    :REM*1Ø4
29Ø PRINT "MONTH{2 SPACEs}PRINC
    IPAL{2 SPACEs}INTEREST{3 SP
    ACEs}BALANCE"        :REM*16
3ØØ PRINT"==================
    ================":REM*219
31Ø GOTO 34Ø             :REM*13Ø
32Ø PRINT "MONTH{7 SPACEs}","PR
    INCIPAL{3 SPACEs}","INTERES
    T{6 SPACEs}"," BALANCE{5 SP
    ACEs}"               :REM*174
33Ø PRINT"==================
    ============================
    ============================
    ="                   :REM*249
34Ø IT=Ø:TP=Ø:PR=Ø       :REM*253
35Ø FOR J=1 TO PY        :REM*22Ø
36Ø I1=IN/PY/1ØØ*AM:P1=P-I1:AM=
    AM-P1                :REM*46
37Ø IT=IT+I1:TP=TP+P:PR=PR+P1
                         :REM*1Ø1
38Ø A$(Ø)=STR$(INT((N+1)*1ØØ)/1
    ØØ)                  :REM*82
39Ø A$(1)=STR$(INT((P1)*1ØØ)/1Ø
    Ø)                   :REM*197
4ØØ A$(2)=STR$(INT((I1)*1ØØ)/1Ø
    Ø)                   :REM*31
41Ø A$(3)=STR$(INT((AM)*1ØØ)/1Ø
    Ø)                   :REM*5Ø
42Ø FOR L=Ø TO 3:A$(L)=A$(L)+"{
    12 SPACEs}":A$(L)=LEFT$(A$(
    L),SP(L)):NEXT       :REM*137
43Ø IF SF=Ø THEN 46Ø     :REM*15
44Ø PRINTA$(Ø),A$(1),A$(2),A$(3
    )                    :REM*168
45Ø GOTO 47Ø             :REM*28
46Ø PRINTA$(Ø);A$(1);A$(2);A$(3
    )                    :REM*197
47Ø N=N+1:NEXT J         :REM*7Ø
48Ø TP=INT(TP*1ØØ)/1ØØ:TP$=STR$
    (TP):TP$=RIGHT$(TP$,LEN(TP$
    )-1)                 :REM*57
49Ø IT=INT(IT*1ØØ)/1ØØ:IT$=STR$
    (IT):IT$=RIGHT$(IT$,LEN(IT$
    )-1)                 :REM*48
5ØØ PR=INT(PR*1ØØ)/1ØØ:PR$=STR$
    (PR):PR$=RIGHT$(PR$,LEN(PR$
    )-1)                 :REM*4
51Ø PRINT:PRINT"{SHFT Y}OU'LL P
    AY A TOTAL OF $";TP$;" THIS
     YEAR!"              :REM*127
52Ø PRINT:PRINT"{SHFT O}F THAT,
     $";IT$;" IS INTEREST AND $
    ";PR$;" GOES TOWARD THE PRI
    NCIPAL."             :REM*76
53Ø IF KE$="P" THEN PRINT#4:CLO
    SE4                  :REM*244
54Ø PRINT                :REM*183
55Ø END                  :REM*164
56Ø REM GET PARAMETERS   :REM*154
57Ø PRINT "{SHFT P}RINCIPAL, OR
     AMOUNT BORROWED ($)";:INPU
    T AM$:AM=VAL(AM$)    :REM*187
58Ø PRINT "{SHFT A}NNUAL INTERE
    ST RATE (%)";:INPUT IN$:IN=
    VAL(IN$)             :REM*193
59Ø PRINT "{SHFT T}ERM OF LOAN
    IN YEARS";:INPUT YR$:YR=VAL
    (YR$)                :REM*154
6ØØ RETURN               :REM*228
61Ø REM CALCULATE PAYMENT
                         :REM*31
62Ø N1=PY*YR:I1=IN/1ØØ/PY:V=1/(
    1+I1)                :REM*91
63Ø P=AM*I1/(1-V{UP ARROW}N1)
                         :REM*29
64Ø RETURN               :REM*13
65Ø REM BALANCE          :REM*17Ø
66Ø FOR I=1 TO N:AM=AM-P+IN/PY/
    1ØØ*AM:NEXT I:RETURN
                         :REM*224 ■
```


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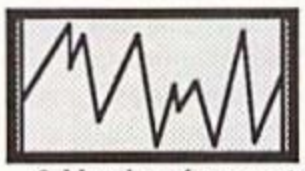

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COMMODORE CLINIC

Is Commodore's 1526 printer truly a maintenance disaster? Has "garbage collecting" been corrected on the C-128? How do you create a C-64 interrupt program?

By LOU WALLACE

SOFTWARE

Q *In the April 1988 Commodore Clinic, a reader asked if there was a program that could read and write to and from an IBM PC and the C-64. You told him that there wasn't any available for the 64.*

That really caught my eye, because in RUN*'s Class Ads section, S.O.G.W.A.P. Software (115 Belmont Rd., Decatur, IN 46733; 219-724-3900) advertises such a program for the C-64, called Big Blue Reader 128/64. I called the company and spoke with Mike Miller, the technical advisor. He told me that it operates on the C-64 and in 64 mode on the 128, reads and writes MS-DOS and supports RAM expansion, among other things. However, he emphasized that it requires a 1571 disk drive. It will not work with a 1541.*

Mike also said that an owner of Big Blue Reader or Big Blue Reader CP/M can get an upgrade of his disk if he sends it to Mike with a check or money order for $18.

—WILLIAM WALCK, SR.
HAMPTON, VA

A Right you are. Big Blue Reader 128/64 is a new version of the older, C-128-only program. I received an update about the same time as your letter, and I'm quite pleased to see the C-64 version.

Q *I'm doing some programming in Basic, using Covox. Is there a 64 compiler available that will handle arrays and unorthodox statements such as Speak and Learn?*

—SISTER ANNE STREMLAU
MANSTON, WI

A Both Basic 64 from Abacus Software (5370 52nd St. SE, Grand Rapids, MI 49508; 616-698-0330) and Blitz 64 from Skyles Electric Works (231E S. Whisman Rd., Mountain View, CA 94041; 415-965-1735) will allow Basic extensions. I don't have the Covox Basic extension to test, but I do suspect that Basic 64 will handle it best, since it has the most versatile memory-management options of the two. For a complete look at all the available Basic compilers for the 64 and 128, see my article, "Ready. . .Set. . .Compile!" elsewhere in this issue.

HARDWARE

Q *Several years ago I purchased some educational software from a company called Futurehouse, Inc. Their programs need a light pen called the Edumate Light Pen, but the company went out of business before I could order one. Do you know of a source for that light pen?*

—VIRGINIA HELBER
SCOTTSDALE, AZ

A No, Virginia, they are no longer available. However, another pen should work quite well. Two of the best are from Inkwell Systems (PO Box 85152 MB290, San Diego, CA 92138; 619-268-8792). One of these is the model 170-C, and it retails for $99.95. The other is the 184-C, which sells for $59.95. Both come with some demonstration programs.

Another good light pen is available from Tech Sketch, Inc. (40 Vreeland Ave., Totowa, NJ 07511; 201-256-0013). Their LP-10 costs $49.95 and comes with a high-resolution color drawing program.

Q *I own a C-64, a 1541 disk drive and a 1702 monitor. I want to get a C-128. I already know about the differences between the 1541 and 1571 drives, but are there differences between my monitor and Commodore's new monitor, the 1084? Will the 128 work just as well with my old monitor, or should I buy the 1084?*

I also have a Star NX-10 printer. Will it work in 128 mode or just 64 mode? Also, will the 128 work with my old 64 cartridges in both modes or just in 64 mode?

One more question: Are there any differences between the 128 and the 128D besides the built-in disk drive?

—JAMES CONNERLEY
SAN FRANCISCO, CA

A Hoo, boy! Let's tackle those questions one at a time. Yes, there are differences between the 1702 and the 1084. The 1702 is a composite monitor and accepts only composite video input. That makes it perfect for the 64, as well as the 128 in 40-Column mode. But the 128 also has an RGB Video mode for use in 80 columns. The 1084 will handle that just fine. The 1084 will also work with the Amiga computers RGBA video signals, making it a more versatile monitor than the much older 1702. But even if you get a 1084, keep that 1702! It's an excellent monitor for VCR systems.

Yes, the Star NX-10 printer works on the 128; that's what I use on mine. Your 64 cartridges should work fine in 64 mode, but will not work in 128 mode. Most of them will cause the 128 to automatically switch to 64 mode, anyway.

And as for differences between the 128 and 128D, there are a few. For one, the ROMs in the disk drive are a little different on the 128D, so a few heavily copy-protected programs might not work right. Another difference is in the amount of dedicated video RAM for the 80-column display. The 128 has 16K, the 128D has 64K. The extra video RAM can be used with some software for very high-resolution color bit-map displays.

Q *Is the 1526 truly a maintenance disaster, or is it that Commodore simply cannot or will not put any effort into providing the spare parts my service center needs to repair it? If it's as bad as I've been told it is, what non-Commodore printer would you suggest in the $170–$200 range?*

—E. J. DEDINSKY
CUYAHOGA FALLS, OH

A From what I have heard, it is a pretty poor printer, with a high incidence of failures, and parts are nearly non-existent. My suggestion is to get another printer, of which there are many good, non-Commodore brands. Several good ones are the Okidata 180, the Star NX-10, the Star NX-1000 and the Panasonic KXP-1092. All of those are in the $175–$250 range, and the companies will very likely have service support for them for the next several years. But keep in mind that when you buy a non-Com- ►

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modore printer, you must also buy a printer interface.

PROGRAMMING

Q *Has the "garbage collecting" problem when using large arrays on the C-64 been corrected in the C-128?*

—R. S. DEFREITAS
LAKE HAVASU CITY, AZ

A Yes, it has. Since the 128 has two 64K RAM banks, one is dedicated to the Basic text (bank 0) and the other to Basic variables (bank 1). On the 128, each string has a "pointer" to the variable using it, which makes garbage collection (which means to discard unused strings and compact the memory required to store them, freeing it for other uses) much, much faster than on the 64. Essentially, the 64 has to search the entire variable list for matches to the strings in order to perform garbage collecting. The 128's method is possible only because of the large amount of RAM available for variables. The 64 doesn't have that luxury, so it uses the slower but more efficient method.

Q *I have a C-128D and a 1581 disk drive. I would like to use the 1571 as drive 9 and the 1581 as drive 8, but there are no dip switches for the 1571 inside the 128D! What's a person supposed to do?*

—SELMAN FIELDS
MONROE, LA

A It has to be done via software, and there is a sample program segment in the 1571 and 1581 user manuals that tells how to do it. It suggests that you turn off all but device 8, switch to device 9 via software, then turn on the second drive (which has been set to device 8 via dip switches). Since that's too much trouble, I wrote a small program to do the swap, specifically for use with a 128D and a 1581 drive. The program changes the 1571 to device 10, then changes the 1581 to device 8 and the 1571 to device 9. It's quite fast and doesn't require you to turn the drives off and on. And, since the 128 can autoboot a program, I made an autoboot disk that loads and runs it automatically.

```
10 REM SWAPPING DEVICE NUMBERS
20 Z$ = CHR$(0):B$ = CHR$(2)
30 F = 8:T = 10:M = 119:GOSUB 70
40 F = 9:T = 8:M = 255:GOSUB 70
50 F = 10:T = 9:M = 119:GOSUB 70
60 END
70 OPEN 1,F,15
80 IF M = 255 THEN PRINT#1,"U0>" +
   CHR$(T):GOTO 100
90 PRINT#1,"M - W"CHR$(M)Z$B$CHR$
   (T + 32)CHR$(T + 64)
100 CLOSE 1:RETURN
```

Q *I'm a beginning machine language programmer, and I'd like to learn how to write an interrupt-driven program for the C-64. Could you give me a simple example?*

—JANE ROCKMYER
CLEVELAND, OH

A I sure can. Writing an IRQ routine is basically very simple. In theory, all you have to do is redirect the IRQ vectors at $0314 to the address of your routine. Then, every 60th of a second, your machine language program is executed. After each access, it should then send the computer on to the address of the regular IRQ routine. To demonstrate, I wrote a very simple program that changes the border and background colors to black and cyan, respectively. You can poke in a new value for the border color (53280) or the background color (53281), but all you'll get is a momentary flash, and the colors instantly return to black and cyan. Here's the machine language source code for the routine.

```
* = $C000                    ; the code is
                               placed at 49152
                               decimal

border = 53280
background = 53281
irqvec = $0314
irqold = $EA31               ; this is the nor-
                               mal address
                               found in
                               $0314/$0315

init    sei
        lda #<irq
        ldy #>irq
        sta irqvec
        sty irqvec + 1
        cli
        rts

irq
        sta tempa            ; store a, x
                               and y
        stx tempx
        sty tempy
        lda bdcolor          ; border color
        sta border
        ldx bkcolor          ; background
                               color

        stx background
        lda tempa            ; restore a, x
                               and y
        ldx tempx
        ldy tempy
        jmp irqold
tempa   .byt 0
tempx   .byt 0
tempy   .byt 0
bdcolor .byt 0               ; black border
bkcolor .byt 3               ; cyan back-
                               ground
        .end
```

If you'd like to see what it does, just type in the short Basic loader below. Once run, it places the machine language routine at 49152 and activates it with a SYS call. The border becomes black and the background cyan. Try changing the colors with Pokes to 53280 (border) and 53281 (background). To get rid of the effect, press the run-stop/restore keys.

```
10 REM SIMPLE IRQ DEMO
20 REM LOU WALLACE
30 REM RUN MAGAZINE
40 AD = 49152
50 READ A:IF A = - 1 THEN SYS
   49152:END
60 POKE AD,A:AD = AD + 1
70 GOTO 50
80 DATA 120,169,13,160,192,141,20,3
90 DATA 140,21,3,88,96,141,46
100 DATA 192,142,47,192,140,48,192
110 DATA 173,49,192,141,32,208,174
120 DATA 50,192,142,33,208,173,46
130 DATA 192,174,47,192,172,48,192
140 DATA 76,49,234,0,0,0,0
150 DATA 3, - 1
```

UPDATE

Q *In last April's Commodore Clinic I read the letter from Ron Wheeler of Amherst, Massachusetts, inquiring about a Fortran compiler for his 128. About the same time I got the April issue, I received a copy of Nevada Fortran from Ellis Computing (5655 Riggins Court, Suite 10, Reno, NV; 702-827-3030) for the CP/M mode of the 128 for $49.95. Service was excellent. The format to ask for is Kaypro 4 for the 128.*

—JOHN LOGUE
ADAMSVILLE, PA

A Thanks for the information, John. Nevada Fortran is the only Fortran I have ever heard of for the 64 or 128, and it was only for CP/M mode. I'm glad to see that it's still available. ■

Do you have a problem or question about your Commodore computer system, software or programming? Send your questions to:

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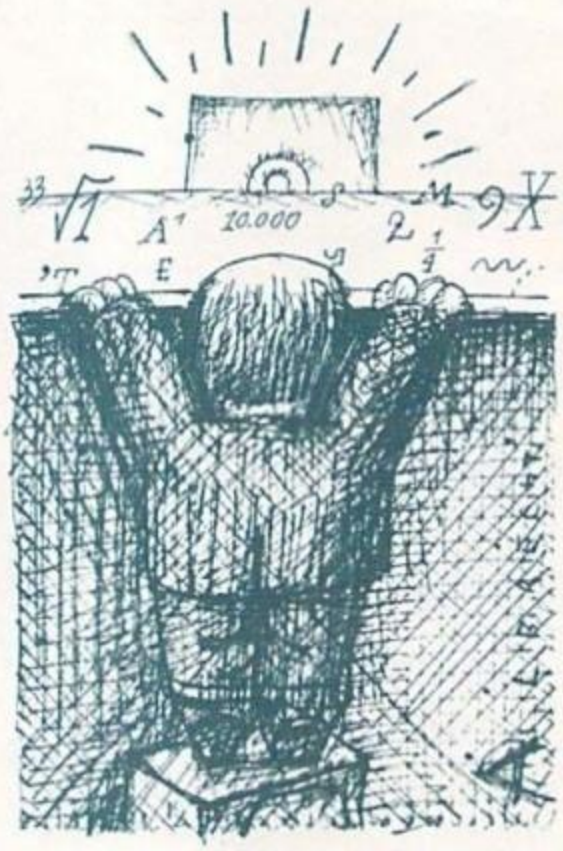
By LOREN LOVHAUG



RECENT MARKET SURVEYS reveal what a lot of us who telecommunicate in the Commodore world already know: that a large percentage of Commodore computerists use modems. There are various reasons for this interest in telecommunications, perhaps the biggest being what I call the Great Treasure Hunt. Thousands of explorers equipped with lists of phone numbers and passwords are scouring local bulletin boards and national networks for the bounty of free public domain software they can download to their C-64s or 128s. Like discovering a chest full of doubloons, finding a great public domain game or utility is both exciting and profitable.

Of course, the search does take effort and, at times, some money. Besides the initial expense of a modem and telecommunications software, you'll incur online and long-distance costs if your search goes beyond local BBSs to national networks. The advantage of networks, such as QuantumLink and GEnie, is one of scale. Their public domain libraries contain thousands of programs for the 64 and 128, and, unlike most local BBSs, they are multi-user, which means you'll never get a busy signal. Their disadvantage is that, unlike most local BBSs, they generally charge a fee for access, based on the amount of time you spend online.

Regardless of where you look for public domain software, it's helpful to have a "treasure map," so I've compiled a list of true gems you can take along as a guide. The list tells where to find these outstanding programs on Q-Link and GEnie, but most are available on local BBSs, as well. I've also placed the program list on *RUN*'s own BBS, the RUNning Board, which you can dial at 603-924-9704.

If you search on the national networks, note that Q-Link programs are referenced by topic and/or uploader, while on GEnie they're referenced by file number, topic and uploader.

GENERAL UTILITIES

Disk Doctor 64 and Disk Doctor 128, by Kevin Hisel; uploaded to GEnie as File #3684 DISK DOCTOR 64 V4.0.SDA, by TIGLON.G, and File #870 DISK DOCTOR128-COMPILED, by DEB.

Kevin Hisel has written several leading public domain programs, and these track and sector editors are two of his best. Kevin's special touches have turned what would otherwise be drab and boring hacker's tools into visual treats that are valuable for rescuing damaged disks and learning how Commodore disk drives work and how disks are organized. The program is menu-driven, and the latest version supports the 1581 disk drive, as well as the 1541 and 1571. The documentation includes a tutorial on Commodore DOS that's written with the beginner in mind, yet is as complete as those found in professionally written texts. The C-128 version runs in 40-Column mode.

Yellow Pages Directory Reorganizer (version 2); uploaded to GEnie as File #5156 YELLOW PAGES V2, by KEVIN HISEL.

Yellow Pages is a handy tool for cleaning up floppy-disk directories and reorganizing files. A C-64 program, it has the unusual ability to use the C-128's enhanced keyboard (numeric keypad, extra function keys, and so forth) when run on a C-128 in 64 mode. It fully supports the 1541, 1571 and 1581 disk drives, including 1581 partitions, is menu-driven and features two scrolling windows for reordering directories, batch-scratching files and visually subdividing directories. Yellow Pages is a snap to operate and a must for anyone who wants to make their disks easier to use and the directories more visually appealing.

Unicopy 64 and Unicopy 128, by Jim Butterfield; uploaded to Q-link as Unicopy 64, by Buttrfield and Unicopy 128, by Buttrfield.

These simple, no-nonsense, batch-file copiers by noted Commodore guru Jim Butterfield have been staples of user's group libraries for years. Nothing fancy or flashy, they just do the job on all Commodore disk drives. The only thing you have to do is tag the files you want copied. Unicopy works with all disk file types except relative. As a bonus, the C-128 version supports the 1700 and 1750 RAM expanders for much faster copying.

RAMDOS 64 and RAMDOS 128, by Fred Bowen and Hedley Davis; uploaded to Q-Link as RAMDOS.arc, by RBAKER (for both the C-64 and C-128); uploaded to GEnie as File #5124 RAMDOS128V4.3.LBR, by SPARROW.J (128 version).

These programs, written by Commodore engineers Fred Bowen and Hedley Davis, let you use the 1700, 1750 and 1764 RAM expanders as lightning-fast pseudo-drives. Although RAMDOS is not compatible with most commercial software, it's helpful for programmers, for use with nonprotected software and in place of an extra drive when copying or reorganizing disks. It supports nearly all the Commodore DOS commands.

Power Driver 64, from the COMAL Users Group; uploaded to Q-Link as POWERDRIVER.SDA, by Captain C.

Power Driver is a special C-64 implementation of the COMAL programming language that includes an interpreter, a compiler/run-time system, X/Y-coordinate and turtle graphics, sprite support, external procedures,

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and much more. COMAL, primarily a fusion of Basic and Pascal, is one of the nicest and most powerful structured programming languages I've used. If you like programming or want exposure to professional structured programming techniques, check COMAL out. This is the language that should have been built into the C-64!

Graphic and Music Programs

Graphics Assult System 64 and Graphics Assult System 128, by Bruce Bowden; uploaded to Q-link as GAS64 (v4) and GAS128 (v4), by BBOWDEN; uploaded to GEnie as File #4485 GAS-64, by MICHAEL.M, and File #4460 GAS128-V2.SDA, by MICHAEL.M.

These wonderful tools provide easy, yet powerful, graphics conversions of Koala, Doodle! and 8K bitmap screens. A host of other features for manipulating graphics data include: magnify, picture shift, bit shift, invert, flip, rotate, turn, slant, load and save as sprites, and toggle between standard and multicolor modes. If you work with Commodore graphics, the Assult System will quickly become a favorite.

PGM Basic, by Lou Wallace, David Darus and Ken French; uploaded to Q-link as PGM and PGM.BIN, by LRW.

PGM Basic is a graphics enhancement wedge for the C-64 that provides extraordinary graphics programming capability, including multiple sprite animation, multiple graphics screens, windows, hi-res font features and much, much more. To fully appreciate the potential of this wedge, be sure to download the PGM demo programs.

SWINTH Music and Graphics Demo, by Glen Bredon and Jim Winnings; uploaded to Q-Link as SWINTH, by Bill Byte; uploaded to GEnie as File #423 SWINTH, by Deb.

SWINTH is perhaps the best known graphics and sound demo for the C-64 and to my knowledge has never been topped! Its colorful, nearly hypnotic, screen patterns and excellent renditions of classic synthesizer "space music," including "Tubular Bells" and themes from *A Clockwork Orange* and Pachibel, make it a favorite of mine. Sometimes, when I'm having a hectic day, I go into the computer room and run SWINTH for a while. You'd be amazed at the tranquilizing effect it has! The graphics are even programmable from a menu, so you can change the color, symmetry and pattern size.

Mac to DOODLE and Mac to GEOPAINT; uploaded to Q-Link as Macto64-epsn.sda (Mac to Doodle!), by Siamak, and Maconvert 2.3 (Mac to geoPaint), by Red Storm; uploaded to GEnie as File #3856 MAC CONVERT V1.2.SDA (Mac to Doddle!), by TIGLON.G, and File #4375 MACGEOPAINT 1.1 (Mac to geoPaint), by M.PACHOLIK.

These programs let you convert Macintosh MacPaint files to C-64 graphics formats, so you can use the thousands of high-quality monochrome MacPaint graphics that are in the public domain. If a MacPaint picture contains more pixels than the 320×200 the C-64 can handle, the Doodle! converters will break it into sections. The MacPaint to geoPaint converters transfer files to geoPaint's proprietary, virtual-screen format.

Note that the programs on Q-Link and those on GEnie aren't the same, but they perform very similar functions.

Enhanced SIDPlayer Promotional Music Player, by Craig Chamberlain; uploaded to Q-Link as ENH SID PROMO.64, by SYSOP JON; uploaded to GEnie as File #5740 COMPUTE!ENHANCED.PLAYER, by E.RODRIGUEZ1.

With this C-64 program, you can play any music file created or transcribed with the SIDplayer or SIDplayer Enhanced music editing system for the C-64 and C-128. The library of such files is huge, and some even include graphics and words that form computer-generated videos!

Games

Laser Eagle; uploaded to Q-Link as EAGLE.V2.SDA, by HotRodTodd.

This arcade-quality game places you in control of a hi-tech plane, with a mission to destroy a fleet of enemy ships attacking the California coast and then to attack their homeland. The game is very well written, with great joystick response, beautiful graphics and super sound effects. I should add that I never got beyond the ships!

Robbers; uploaded to Q-Link as ROBBERS, by Fargo; uploaded to GEnie as File #1394 ROBBERS, by BOROMIR.

In this part arcade/chase and part adventure game, you plunder your way through multiple screen mazes while trying to avoid police, ghosts, mines and other traps. The graphics may seem unimpressive and blocky, but the game plays well and is extremely addicting.

128 Invaders, by Mike Spice; uploaded to Q-Link as 128 Invaders, by Lovhaug.

This game is without a doubt the best C-128 arcade-type game I've seen. Yes, it's another implementation of the classic Space Invaders, but it uses the 80-column screen, so it's a real treat for RGBI monitor owners. The animation is smooth and sprite-like, the play and sound are fantastic, and the program supports joystick and keyboard play and multiple speeds—just to keep you humble!

Now, how about *your* favorite public domain programs? I hope you'll let me know what they are, so I can pass the word. ■

Loren Lovhaug is a programmer and writer with lots of telecommunications experience. Along with being SYSOP of Q-Link's C-128 Special Interest Group and co-SYSOP of GEnie's Commodore Flagship, he publishes Twin Cities 128, *a newsletter for C-128 users. You can write to him care of:*

Telecomputing Workshop
RUN Magazine
80 Elm St.
Peterborough, NH 03458

You can also send him electronic mail on Q-Link (LOVHAUG) or GEnie (Sparrow.J).

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GEOWATCH

While new enhancements are making GEOS ever more sophisticated, the original program alone has plenty of potential.

By SUSAN LAMB

SO MANY NEW ENHANCEMENTS have been introduced for GEOS that it's easy to forget the versatility of the original program. Users who are just starting to become familiar with GEOS can accomplish a lot while they're learning. For instance, the main GEOS disk includes a word processor, geoWrite, and the graphics program, geoPaint, both of which offer very respectable desktop publishing capabilities. Following is a list of items anyone can create with only the main GEOS disk.

LETTERHEADS

The use of geoPaint obviates the need for preprinted, personalized stationery, because you can print a logo and letterhead at the top of any page. While constructing the letterhead in geoPaint limits your design to the width of a drawing window, you can place it flush on the left, centered, or to the right.

With geoWrite 1.3, you can't place the left margin further right than 3 on the on-screen ruler, or get a photo scrap closer to the right margin than five marks. However, you can create the graphic part of the letterhead, to be centered or flush left, and then type in the address line and any additional information across the whole width.

COLUMNS OF TEXT

With the original GEOS and a little planning, you can produce dual-column printouts, with the text aligned evenly down the left side and unevenly down the right. Start by typing the first page of your document, with the right margin set at 4; then print it out. This will be your guide for creating the left column in your actual document. Next, enter and print out the second page of your document, which will become the second column in the finished version.

Now you're ready to create the actual document. First, set a tab at about 4.3 and the right margin to the position farthest to the right. Using the two printouts as templates, type the first line of column 1 (read from the first printout), press control/I to tab across the screen and type the first line of column 2 (from the second printout). Next, press return and type the second line of column 1; then tab; then the second line of column 2, and so on.

I've used this technique without printing out the columns beforehand, but it takes a lot of concentration. The secret is to keep an eye on the ruler, and when the left line starts to reach 4, tab over to the right column.

It's also possible to justify both edges of each column by hyphenating long words at the ends of lines, inserting spaces between words and pressing return at the end of each line to prevent word wraps. While you probably won't achieve fully accurate left and right justification in this way, you can get close.

You can set columns flush-right (aligned down the right side) as well. Just position the cursor at the beginning of the line of text and insert spaces until the last letter of the last word in the line reaches the right margin; then press return to prevent word wraps. If you insert too many spaces and the word wraps, delete spaces to bring the word back up.

Another handy feature of geoWrite is centering every line—say for a menu, short story or poem. After typing a line, place the cursor at the beginning of it and insert spaces until you have roughly the same number of spaces at each end. By aligning the beginning and end of the line with the margin marks at the top of the screen, you can achieve good results in centering text. Once the line is centered, press return right after the last letter in the line.

When you've become proficient at manipulating lines of text with spaces, many creative possibilities will open up. For instance, you can make a simple newsletter by typing a headline across the top in a large font, then constructing the columns with tabs. To create a dashed vertical line between the columns, set an additional tab and press the Commodore key and up-arrow. To create solid horizontal lines, use the space bar with the underline option activated, or use the Commodore key and minus sign. Because GEOS uses a WYSIWYG (what you see is what you get) display, the screen accurately shows how each page of text will appear.

FILL AND UNDO

Enough for geoWrite; let's take a look at geoPaint, another good program on your main GEOS disk. GeoPaint offers a Fill feature, indicated by a faucet, which not only fills an enclosed space with a pattern, but can also replace any solid black line or shape with a pattern.

Suppose you want to make a quick dotted box for a coupon. First, draw an outline box, fix the crosshair exactly on the line and click. I've found that a diagonal or screen-style pattern makes the best dotted line, but you can try others for different effects. Incidentally, if you miss the line when using the Fill command, and your whole screen starts to fill, wait patiently until it's finished; then press Undo.

The Undo feature lets you perform experiments until you achieve the effect you want. Try using Fill to substitute various patterns for a solid black shape; then press Undo after viewing each effect. If you want to make a screened block of text (with a background "behind" the text), try various patterns and type sizes with the Fill and Undo commands to see which combination looks best and is most readable.

To reverse the copy out of a screened box, set reversed text in a black box, erase the white line located above the characters, position the Fill crosshair on the box and click. Be sure to also fill the centers of letters such as A and D.

Bear in mind that Undo works only on the most recent change. To try a number of different effects by filling, shading and reversing, update your drawing before you start and press recover to get the original back. Be careful not to move the drawing window or use any options in the file menu. If you do, Undo will have no effect on your changes—they'll be permanent.

THE SOLID BOX

Another useful GEOS option is the Solid Box feature, which also makes an

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efficient eraser. Because the Eraser tool that GEOS provides measures 8 × 8 pixels, it's too big for erasing a one-pixel-size area and too small to efficiently erase large areas. However, a box made with the Solid Box option can serve as a variable-sized eraser, ranging in dimension from one pixel to the entire screen. Since the Solid Box feature includes a ruler, you can also use solid boxes as straight lines in your geoPaint drawings.

Double Printing

If you can send a sheet of paper twice through your printer and reposition it each time at exactly the same starting point, you can print documents that incorporate geoPaint graphics and geoWrite text. First design a full-page border in geoPaint as follows: Create the upper-left-corner section and copy it. Then, using the Mirror X and Mirror Y options to reverse the image, move to paste it in the other three corners. Finally, fill in the side, top and bottom sections of the border with the pattern of your choice and print it out.

Use this printout to sketch a quick layout for your document, keeping in mind the sizes of your fonts. To set the proper margins in geoWrite, lay the border over a page of the printout you're using. This will show you the right margin settings. If you can't see through the paper, overlay the two sheets on a window.

You also need to estimate how far down the page to start your print and where to stop. You can do this accurately by first printing out the border, then sending the paper back through the printer to print the text. This method is especially useful for large amounts of text, since entering text in geoPaint is more difficult and time-consuming than in geoWrite. ■

Susan Lamb is a painter and free-lance commercial artist who uses GEOS extensively for desktop publishing.

Commonsense Approach To Computing

1. The best arrangement for your computer system is to plug your components into a power strip, which you should shut off when not using your computer. If you don't have a power strip, be sure to always unplug your power supply when you're not using your computer. Even though your computer is off, your power supply can overheat.

2. Water can destroy data on your disk. Avoid storing your disks in excessively humid conditions. Also avoid extremes of hot and cold, which may distort or compromise the reliability of the data on your disk. Try to keep 'em at room temperature.

3. To keep your disk drive from overheating, raise it to allow air to circulate under and over it. To cool off their drives, computerists have devised many different methods—for example, spent bullet shells or sawed-off pencils in the drive's screw holes, fans directed at the unit or paper chimneys over the drive's vents!

4. If you spend a lot of time in front of your computer monitor, you run the risk of eyestrain. Get an anti-glare shield, which will also protect you from radiation and eliminate static shock. Staring at a computer screen a lot can also cause headaches, fatigue, irritability and facial twitches. Here are some things you can do:
—take a visual break every 20 minutes. Focus on different distances.
—if you don't have an anti-glare shield, make sure there are no bright lights reflecting off the screen and into your eyes. Also, don't locate your computer by, or directly in front of, a window. The contrast between the outside brightness and the low-level lighted screen can cause eyestrain.
—according to optometrists, green letters on a green screen is the worst combination for your eyes; amber screens are better; but black-and-white screens are best.

5. Sitting for long hours in front of your monitor can also cause back, neck and shoulder strain; slow blood circulation in the legs; and slacken muscle tone. An ergonomically designed chair can minimize these health hazards and muscular aches. Also, constantly changing your sitting position and good body posture with feet firmly on the floor can help. ■

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HARDWARE GALLERY

Make your life easier with peripherals for your printer and MIDI-compatible musical instruments.

Compiled by BETH S. JALA

HOT SHOT PLUS ..... B+

This Interface Is Hot Stuff!

If you've owned your C-64 or C-128 for any length of time, you're probably aware that they require a printer interface cable in order to be used with parallel (non-Commodore compatible) printers. But buying a printer interface can be confusing. It's similar to buying a computer, only not as expensive.

New Commodore-compatible interface development has practically been at a standstill for over a year. However, a new parallel printer interface equipped with an 8K print buffer has surfaced. It's called the Hot Shot Plus.

When our review unit arrived, accompanied by a Fonts and Utilities disk, I found that the Hot Shot Plus looked much like most other Commodore-compatible printer interfaces. The small cartridge that contains the interface's ROMs and RAMs sports a reset button on the face of the memory housing. Pressing the reset button once clears any unprinted text in the unit's memory. Pressing it twice in rapid succession erases all internal settings and fonts.

When you read the user's guide and learn to use the Hot Shot Plus's many print options, it becomes apparent that this is not an ordinary printer interface. However, I want to reassure you that there's nothing complicated about using it. Anyone capable of plugging in its three wires—to the disk drive, printer and cassette port—and setting the DIP switches according to the manual can use it as a standard, no-frills, 8K data-buffer printer interface. But you're missing out on a lot of exciting fonts and graphics printing action if you don't take time to explore the other things this versatile unit can accomplish.

The Hot Shot Plus has two banks of DIP switches that you use not only for basic configuration purposes, but also for more involved operations. Through two DIP switches, you can set Commodore 1525 emulation and convert your Star- or Epson-compatible printer into a Commodore clone so that it will, among other things, properly print all the Commodore graphics. Or, of even greater interest, a DIP-switch-selectable Enhanced Features mode provides both Commodore emulation and the ability to use most of the Hot Shot Plus's special features.

What Hot Shot Plus owners will really find delightful, though, is the unit's Graphics Enhancement mode, which lets users of graphics packages—like GEOS, for example—create single-, double- and quadruple-density graphics printouts. These enhanced-density printouts will wear your printer's ribbon quicker, but the compensation is that they allow worn, faded ribbons to produce good-quality printouts. Also, if the print quality of your text is more important than printout speed, six built-in fonts allow for NLQ printing.

Regardless of whether you're a novice or an expert printer programmer, it's vital to realize that the Hot Shot Plus offers nine modes of operation via secondary addresses. For those of you new to printers, a secondary address is the "n" number in the statement: OPEN 4,4,n.

The four Hot Shot Plus Secondary Address modes you're most likely to use are Transparent, Commodore Emulation, Hex and Hot Shot Plus Command Channel. Transparent mode cancels out any interface data conversions (provided you leave other DIP switches off) when using printer-driver options found on graphics programs. Hex mode prints all output in hexadecimal form, and Hot Shot Plus Command mode opens up over 30 print features exclusive to this interface.

Once you've hooked up the interface and tested your printer with it, get started by loading the Fantastic Font Editor program from the interface. It makes no difference whether you're in C-64 or in 40- or 80-Column C-128 mode, the Hot Shot Plus's built-in software is compatible with all.

From the Fantastic Font Editor's main menu, you can load, edit and resave fonts to the Hot Shot Plus, whose standard 8K—easily expandable to 64K—of RAM holds two regular fonts or one hi-res font. For more permanent storage, you can load and save fonts to disk. You can even bypass the computer and load fonts directly from disk to the interface's memory. Like most font editors, you can load, examine in enlarged detail, alter and print every character in a particular font.

Having a copy of the Hot Shot Plus Fonts and Utilities disk in the drive when you're using the editor enables you to print out all the fonts included

REPORT CARD

A Superb!
An exceptional product that outshines all others.

B Good.
One of the better products available in its category. A worthy addition to your hardware collection.

C Average.
Lives up to its billing. No major hassles, headaches or disappointments here.

D Poor.
This product has some problems. There are better on the market.

E Failure.
Many problems; should be deep-sixed!

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The hardware and software of Sonus's Personal Musician.

on that disk. This disk contains ten regular resolution fonts and three variations of correspondence and Helvetica fonts. Four hi-res fonts round out the selection.

Also included on the Fonts and Utilities disk is an X-O converter file for use in converting fonts from the Xetec Super Graphics Gold interface. Furthermore, the disk contains a file called "Makeautoup" that you can use instead of the Fantastic Font Editor to make a sequential ASCII file called "Autoup." Autoup can be used to upload fonts and command-channel commands from disk to the Hot Shot Plus. While I have used it with the standard 8K Hot Shot Plus, I think it's a necessity if you've upgraded the memory of the Hot Shot Plus and want to fill its expanded RAM with printer fonts. However, the Autoup file lacks the error trapping of the Editor, so you're warned in the manual that you can crash the Hot Shot Plus if you overload the RAM with font data.

My list of complaints is short. I'll begin with the unit's cassette port plug. Like most parallel printer interfaces, the Hot Shot Plus draws power from your computer's cassette port in order to operate. This power is delivered through a thin four-foot red wire with a plug that fits into your cassette output port. I found that this cassette port plug, although it works fine with both the C-64 and C-128, is difficult to remove from the C-128D's deeply recessed cassette port. I had to rummage through my desk for a pair of needlenose pliers whenever I wanted to remove it.

Next, I didn't like the fact that fonts and settings sent to the interface could be inadvertently wiped out by hitting the reset button two or more times within five seconds. I found this out the hard way the first time I used it to abort a printout. Omnitronics should affix a fluorescent warning sticker informing new users of such dangers.

Finally, I wasn't overly pleased with the user's manual, which lacked an index for quick and easy reference. But that's it for the complaint side of the ledger.

All too often, the interface between the computer and printer is seen as the weakest link in the system. Nothing is worse than an interface that converts when you want output data unaltered and doesn't convert when you want data converted. Omnitronix seems to have avoided that traditional weakness in creating an almost flawless link between your Commodore and printer. *(Omnitronix, Inc., 760 Harrison St., Seattle, WA 98109. $99.95.)*

—TIM WALSH
RUN STAFF

PERSONAL MUSICIAN ..... B+

Make More Music; Make Your *Music!*

Do you own a MIDI-equipped musical instrument? Are you thinking of buying one? Confused about the hardware and software you'll need to take advantage of the instrument's capabilities? Sonus's Personal Musician package might be the answer to all your questions.

The Personal Musician includes everything you need to attach your Commodore to your favorite MIDI synthesizer and begin using your computer as a multitrack MIDI recorder. The package includes a MIDI interface cartridge with one "in" and two "out" ports, two six-foot-long MIDI cables, a disk-based sequencer program and a well-organized user's manual.

Setting up is simple: Plug in the cartridge and attach the cables from the synthesizer's MIDI-out port to the cartridge's MIDI-in port and vice versa; then load the program disk, and you're ready to begin!

As you play your MIDI instrument, performance data describing the notes and the timing of each key-press is recorded into your computer's memory. Once a single track has been recorded, you can go back and add a second track by playing along as you listen to the first.

In this way, four separate tracks can be layered and the resulting sequence saved to disk. Up to eight different sequences can be held in memory at one time. These can be arranged in any order to create entire songs. Since each song you compose can use as many as 16 different sequenced elements, you're not limited to using each of your eight sequences just once.

Because the sequencing program records only performance data and not the actual sound produced by your synthesizer, you can do some pretty amazing things with a sequence once it's recorded. For instance, you can alter the tempo of a composition without changing its pitch; or you can instantly transpose the piece into a new key. Other options let you correct performance errors by re-recording or "punching in" over the section of a track where the mistake occurred, or by having the computer auto-correct the timing of an entire track to the nearest correct rhythmic value, from a quarter-note all the way down to a thirty-second-note triplet.

You should be aware that, even with all of its powerful features, the sequencing program packed with the Personal Musician is Sonus's bottom-of-the-line model, and that other C-64 sequencers, like the company's own Glasstracks, offer greater flexibility. Fortunately, should you decide to upgrade, sequences created with the Personal Musician are fully compatible with Glasstracks and even with the Super Sequencer 128. For the price, however, the Personal Musician software/interface combination is an excellent and affordable way to make the move into MIDI. *(Sonus Corp., 21430 Strathern St., Suite H, Canoga Park, CA 91304. C-64/$129.95.)*

—BOB GUERRA
SOUTH BOSTON, MA ■

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From p. 16.

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1ØØ B=B+N:IFB<YTHEN8Ø                    :REM*29
11Ø GETKEYA$:GRAPHICØ:PRINT"PRESS ANY KEY
    TO CREATE NEW PATTERN.":GETKEYA$:RUN
                                         :REM*152
```

—ROBERT R. HOFER, BUFFALO, NY ■

Magic is a forum for RUN *readers to share their programming tips, brief software or hardware modifications, shortcuts or items of general interest. If you have an idea to make computing easier, faster, more exciting and enjoyable, send it to:* Magic, RUN Magazine, 80 Elm St., Peterborough, NH 03458

RUN *pays $10 to $40 for each trick published. $50 and a Magic Contributor T-shirt are awarded for the Trick of the Month.*

MEGA-MAGIC

Salvage data from disks that you have accidentally reformatted.

DISK RESTORER

This pair of programs can retrieve files from disks you accidentally reformat with the OPEN15,8,15,"N0:<disk-name> command. Save Directory (Listing 1) reads track 18 (the directory track) of a disk you want to protect and saves the data as a sequential file on a second disk, perhaps the disk containing these programs. Later, if you accidentally reformat the protected disk, Restore Directory will write the sequential file back to track 18, thereby restoring the protected disk's files to use.

Type in both programs, using *RUN*'s Checksum program. When you run Save Directory, it will prompt you to insert the disk you want to protect into the drive, press any key, then insert the disk that will hold the sequential file. The protected disk's name is used as the filename of the sequential file, and if there's a file of that name already on the sequential file disk, the program will ask if it's okay to delete it. If not, press N to exit the program; otherwise, press Y to go ahead and save the new file over the old one. Run Save Directory once for each disk you want to protect, swapping disks as prompted.

When you accidentally reformat a protected disk, load and run Restore Directory. Then insert the sequential file disk (if it's other than the disk containing these programs) and enter the name of the protected disk. The program reads in the sequential file with that name, then sounds an alarm to remind you to place the protected disk in the drive. If you leave the file disk in the drive, you'll get two bad disks.

Note that these programs retrieve files only from disks reformatted with a short format command, which zeroes track 18 but leaves the files intact. If you reformat using a disk ID code, your files are actually erased and irretrievable.

Also bear in mind that changes to a disk after you save its directory won't be reflected in the sequential file. If a disk is important, resave its directory every time it's altered. Of course, if you don't resave the directory, Restore Directory can still recover some files.

In addition to restoring disk directories, these programs can be used to unscratch individual files on protected disks, as long as you do it right after the scratch operation. Just run Restore Directory, and, *presto*!—your file is back! Ⓡ

—KENNY LAWSON, INDIANAPOLIS, IN

Listing 1. Save Directory program.

```
1Ø REM C-64 SAVE DIRECTORY - KENNY LAWSON
                                         :REM*119
2Ø POKE56,141:CLR                        :REM*58
3Ø FORX=1TO12:D$=D$+CHR$(17):NEXT:FORX=1TO
   19:T$=T$+CHR$(32):NEXT                :REM*152
4Ø TB$=CHR$(19)+D$+T$                    :REM*5
5Ø POKE5328Ø,Ø:POKE53281,Ø:PRINTCHR$(3Ø):K
   B=198                                 :REM*134
6Ø PRINT"{SHFT CLR}{CTRL 9}{6 SPACEs}SAVE
   DISK BAM AND DIRECTORY{6 SPACEs}"
                                         :REM*224
7Ø PRINT"{5 CRSR DNs}INSERT DISK TO BE SAV
   ED, THEN PRESS"                       :REM*8
8Ø PRINT"{CRSR DN}ANY KEY TO BEGIN THE PRO
   CESS.":POKEKB,Ø                       :REM*86
9Ø GETA$:IFA$=""THEN9Ø                   :REM*117
1ØØ GOSUB37Ø:REM READ DIRECTORY          :REM*155
11Ø GOSUB21Ø:PRINT"{SHFT CLR}{4 CRSR DNs}N
    OW INSERT THE DISK YOU WISH TO SAVE"
                                         :REM*17
12Ø PRINT"{CRSR DN}THE FILE ONTO, AND PRES
   S ANY KEY."                           :REM*195
13Ø GETA$:IFA$=""THEN13Ø                 :REM*23Ø
14Ø REM SAVE DIRECTORY                   :REM*159
15Ø SA=36Ø96:OPEN15,8,15:OPEN8,8,8,FI$+",S
   ,W":GOSUB26Ø                          :REM*161
16Ø PRINT"{SHFT CLR}{1Ø CRSR DNs}{12 SPACE
   s}WRITING FILE..."                    :REM*213
17Ø FORX=ØTO255:A$=CHR$(PEEK(SA+X)):PRINT#
   8,A$;:NEXT                            :REM*51
18Ø SA=SA+256:IFPEEK(SA)<>18THENFF=1
                                         :REM*77
19Ø FORX=ØTO255:A$=CHR$(PEEK(SA+X)):PRINT#
   8,A$;:NEXT:IFFF=ØTHEN18Ø              :REM*1Ø4
2ØØ CLOSE8:PRINT#15,"IØ":CLOSE15:END
                                         :REM*41
21Ø REM WARNING NOISE                    :REM*16
22Ø POKE54296,15:POKE54295,Ø:MM=54272:POKE
```

RUN it right: **C-64; disk drive**

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```
    MM+6,Ø:POKEMM+5,237                    :REM*238
23Ø POKEMM+2,2ØØ:POKEMM+3,Ø:POKEMM+1,6Ø:PO
    KEMM+4,65                              :REM*233
24Ø FORCC=1TO1Ø:POKEMM+1,27:FORUU=1TO15Ø:N
    EXT:POKEMM+1,14                        :REM*2Ø6
25Ø FORUU=1TO15Ø:NEXT:NEXT:POKEMM+4,Ø:POKE
    MM+24,Ø:RETURN                         :REM*5Ø
26Ø REM CHECK DISK ERROR CHANNEL           :REM*131
27Ø INPUT#15,EN,EM$:IFEN<2ØTHENRETURN
                                           :REM*128
28Ø IFEN=63THEN31Ø                         :REM*24Ø
29Ø PRINT"{SHFT CLR}{8 CRSR DNs}DISK ERROR
    !..."EM$:PRINT#15,"UJ"                 :REM*157
3ØØ FORX=1TO25ØØ:NEXT:CLOSE8,15:END
                                           :REM*131
31Ø GOSUB21Ø:PRINT"{SHFT CLR}{9 CRSR DNs}T
    HAT FILE ALREADY EXISTS ON THIS DISK."
                                           :REM*82
32Ø PRINT"{CRSR DN}SCRATCH "FI$" ?{3 SPACE
    s}(Y/N)":POKEKB,Ø                      :REM*215
33Ø GETZ$:IFZ$=""THEN33Ø                  :REM*128
34Ø IFZ$="N"THENPRINT#15,"UJ":GOTO3ØØ
                                           :REM*24Ø
35Ø IFZ$<>"Y"THEN33Ø                      :REM*25Ø
36Ø PRINT#15,"SØ:"+FI$:PRINT"{2 CRSR DNs}"
    FI$" IS BEING SCRATCHED.":GOTO14Ø
                                           :REM*236
37Ø REM READ DIRECTORY                     :REM*119
38Ø SA=36Ø96:PRINT"{SHFT CLR}{1Ø CRSR DNs}
    {9 SPACEs}READING TRACK{3 SPACEs}SECTO
    R"                                     :REM*94
39Ø PRINTTB$"18{7 SPACEs}Ø"                :REM*19
4ØØ OPEN15,8,15:OPEN8,8,8,"#":PRINT#15,"U1
    :"8;Ø;18;Ø                             :REM*199
41Ø FORX=ØTO255:GET#8,A$:A$=A$+CHR$(Ø):POK
    ESA+X,ASC(A$):NEXT                     :REM*138
42Ø SA=SA+256:NS=1                         :REM*1Ø3
43Ø CLOSE8:CLOSE15:OPEN15,8,15:OPEN8,8,8,"
    #":PRINT#15,"U1:"8;Ø;18;NS             :REM*57
44Ø PRINTTB$"18{1Ø SPACEs}{4 CRSR LFs}"NS
                                           :REM*139
45Ø FORX=ØTO255:GET#8,A$:A$=A$+CHR$(Ø):POK
    ESA+X,ASC(A$):NEXT                     :REM*162
46Ø IFPEEK(SA)<>18THENCLOSE8:CLOSE15:GOTO4
    8Ø                                     :REM*136
47Ø NS=PEEK(SA+1):SA=SA+256:GOTO43Ø:REM*98
48Ø SA=3624Ø:FI$="":FORX=SATOSA+15:FI$=FI$
    +CHR$(PEEK(X)):NEXT                    :REM*17
49Ø CT=Ø:FORX=1TO16:IFMID$(FI$,X,1)=CHR$(1
    6Ø)THENCT=X:X=16                       :REM*156
5ØØ NEXT:FI$=LEFT$(FI$,CT-1):RETURN
                                           :REM*24Ø
```

Listing 2. Restore Directory program.

```
1Ø REM C-64 RESTORE DIRECTORY - KENNY LAWS
   ON                                      :REM*171
2Ø REM POKE56,141:CLR                      :REM*163
3Ø FORX=1TO12:D$=D$+CHR$(17):NEXT:FORX=1TO
   19:T$=T$+CHR$(32):NEXT                  :REM*152
4Ø TB$=CHR$(19)+D$+T$                      :REM*5
5Ø POKE5328Ø,Ø:POKE53281,Ø:PRINTCHR$(3Ø):K
   B=198                                   :REM*134
6Ø PRINT"{SHFT CLR}{CTRL 9}{7 SPACEs}RESTO
   RE A DISK DIRECTORY{8 SPACEs}"          :REM*98
7Ø PRINT"{5 CRSR DNs}ENTER NAME OF SEQUENT
   IAL FILE EXACTLY"                       :REM*145
8Ø PRINT"AS IT APPEARS ON THE DISK.{CRSR D
   N}":INPUTFI$                            :REM*147
9Ø OPEN15,8,15:OPEN8,8,8,FI$+",S,R":GOSUB3
   4Ø                                      :REM*37
1ØØ SA=36Ø96:FORX=ØTO255:GET#8,A$:A$=A$+CH
    R$(Ø):POKESA+X,ASC(A$):NEXT            :REM*214
11Ø SA=SA+256:FORX=ØTO255:GET#8,A$:A$=A$+C
    HR$(Ø):POKESA+X,ASC(A$):NEXT           :REM*18Ø
12Ø IFPEEK(SA)=18THEN11Ø                   :REM*93
13Ø CLOSE8:CLOSE15                         :REM*245
14Ø GOSUB29Ø:PRINT"{SHFT CLR}{1Ø CRSR DNs}
    BE SURE DISK TO RESTORE IS IN THE DISK
    {CRSR DN}"                             :REM*193
15Ø PRINT"DRIVE, THEN PRESS ANY KEY TO BEG
    IN.":POKEKB,Ø                          :REM*154
16Ø GETA$:IFA$=""THEN16Ø                   :REM*34
17Ø REM REWRITE DISK DIRECTORY             :REM*218
18Ø PRINT"{SHFT CLR}{1Ø CRSR DNs}{9 SPACEs
    }WRITING TRACK{3 SPACEs}SECTOR"
                                           :REM*157
19Ø PRINTTB$"18{7 SPACEs}Ø"                :REM*4Ø
2ØØ CLOSE15:SA=36Ø96:NS=1:OPEN15,8,15:OPEN
    8,8,8,"#":PRINT#15,"U1:"8;Ø;18;Ø
                                           :REM*114
21Ø PRINT#15,"B-P";8;Ø:FORX=ØTO255:PRINT#8
    ,CHR$(PEEK(SA+X));:NEXT                :REM*22
22Ø PRINT#15,"U2";8;Ø;18;Ø:CLOSE8:CLOSE15
                                           :REM*Ø
23Ø SA=SA+256:OPEN15,8,15:OPEN8,8,8,"#":PR
    INT#15,"U1";8;Ø;18;NS                  :REM*162
24Ø PRINTTB$"18{9 SPACEs}{3 CRSR LFs}"NS
                                           :REM*232
25Ø PRINT#15,"B-P";8;Ø:FORX=ØTO255:PRINT#8
    ,CHR$(PEEK(SA+X));:NEXT                :REM*62
26Ø PRINT#15,"U2";8;Ø;18;NS:CLOSE8:CLOSE15
                                           :REM*196
27Ø NS=PEEK(SA+1):IFPEEK(SA)=18THEN23Ø
                                           :REM*245
28Ø OPEN15,8,15,"I Ø":CLOSE15:PRINT"{SHFT C
    LR}{1Ø CRSR DNs}DISK IS NOW RESTORED."
    :END                                   :REM*246
29Ø REM WARNING NOISE                      :REM*64
3ØØ POKE54296,15:POKE54295,Ø:MM=54272:POKE
    MM+6,Ø:POKEMM+5,237                    :REM*61
31Ø POKEMM+2,2ØØ:POKEMM+3,Ø:POKEMM+1,6Ø:PO
    KEMM+4,65                              :REM*185
32Ø FORCC=1TO15:POKEMM+1,27:FORUU=1TO15Ø:N
    EXT:POKEMM+1,14                        :REM*7Ø
33Ø FORUU=1TO15Ø:NEXT:NEXT:POKEMM+4,Ø:POKE
    MM+24,Ø:RETURN                         :REM*66
34Ø REM CHECK DISK ERROR CHANNEL           :REM*82
35Ø INPUT#15,EN,EM$:IFEN<2ØTHENRETURN
                                           :REM*83
36Ø PRINT"{SHFT CLR}{8 CRSR DNs}DISK ERROR
    !..."EM$:PRINT#15,"UJ"                 :REM*215
37Ø FORX=1TO25ØØ:NEXT:CLOSE8,15:END
                                           :REM*197 ■
```


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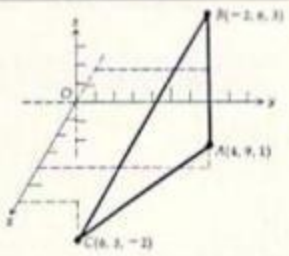

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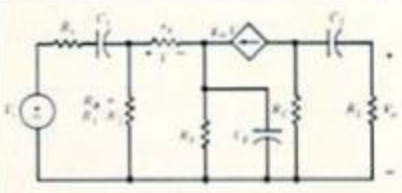

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Learn To Walk Before You RUN

WE RECEIVE MANY LETTERS from new Commodore owners who want to type in program listings from *RUN* and need help in getting started. To answer many of the questions novice users have, we present the following guidelines.

1. First, keep in mind that as a beginner you should enter only short Basic programs. Avoid machine language listings and lengthy Basic programs until you get the hang of what you're doing.

2. To help you catch mistakes in typing in listings, we publish *RUN*'s Checksum program elsewhere in this issue.

3. If you intend to save the program you're typing in on a brand new disk, you must format that disk. To do this, insert the disk in your drive and type:

OPEN15,8,15 <press return>
PRINT#15,"N0:NAME,##" <press return>

The ## is a two-character identifier that can be any combination of letters or digits. NAME can be any title for the disk that you choose, as long as it's 16 characters or less.

After entering the above lines, wait for a few minutes while the disk spins inside the drive. When the disk stops, the formatting is done. Then type:

CLOSE15 <press return>

In 128 mode on a C-128, you can shorten this procedure by typing:

HEADER "NAME,##" <press return>

Caution: The formatting process erases any material already on the disk, so if you're formatting a used disk, make sure it doesn't contain any programs you want to keep. See item 11 below, on reading the disk directory, if you need to find out what's on the disk.

4. Before you start typing in a program listing, your computer's memory needs to be empty. To make sure it is, turn the computer off, wait a few seconds, and turn it on again.

5. As you type in the listing, remember to press the return key after typing each line. This enters the line into memory.

6. If you want to review what you've entered, type LIST and press the return key; all the lines you've entered will scroll by. You can slow the scrolling on the C-64 by holding down the control key, and on the C-128 by pressing the no-scroll key. To view certain specific lines, type LIST, followed by the line numbers you want; then press the return key. For example, LIST 10–50 displays lines 10 through 50, and LIST 20 displays only line 20.

7. If you find an error in a line, delete the incorrect characters with the insert-delete key, then retype that portion and press return to enter the new line in memory.

8. Be sure to save the program to disk fairly often during the typing process. Otherwise, you could lose all your work if a power glitch wipes out your computer's memory. To save a partial or complete Basic program listing, type:

SAVE "NAME",8 <press return>

In 128 mode on a C-128, you can press F5, type in NAME and press the return key. Here, NAME is the filename you want the program to have, not the disk name you used when formatting.

Each time you save a revised program to the same disk, you must change its filename, or a disk error will occur, even if only one character is changed. An easy way to vary the filename is by adding version numbers to the end of the basic name (Program.1 and Program.2, for example). The numbers will also tell you which version is the latest.

9. If you wish to erase (scratch) unwanted programs from a disk, type:

OPEN15,8,15 <press return>
PRINT#15,"S0:filename" <press return and wait a few seconds>
CLOSE15 <press return>

In 128 mode on a C-128, you can type:

SCRATCH "NAME" <press return>

Be sure not to erase the final version!

10. Always save the final version of a program to two disks, so you have a backup copy in case one of the disks gets damaged. When saving to two different disks, you can use the same program name in each case.

11. To view a complete list of the filenames on a disk (i.e., read the disk directory), type:

LOAD "$",8 <press return>
LIST <press return>

In 128 mode on a C-128, you can just press F3.

12. When you know what program you want to load, next make sure you know *exactly* how its filename is spelled in the disk directory, including punctuation, special characters and spaces. A mistake in the filename will keep the load from working.

If the disk directory is still on the screen when you enter the Load command, you can refer to that for the spelling. If the directory will be gone from the screen by the time you enter the Load command, jot down the exact spelling of the filename for reference. Once you're sure of the filename, load the program by typing:

LOAD "NAME",8 <press return>

In 128 mode on a C-128, you can just press F2, type in the filename and press the return key.

13. After you've loaded the program, enter RUN to use it. ■

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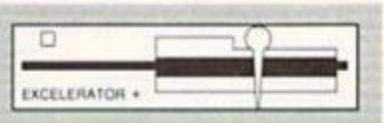

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RUN's Checksum

TYPE IN *RUN*'s CHECKSUM, which serves for both the C-64 and for the C-128 in either 40- or 80-Column mode, and save it to disk before running. When typing in a program from *RUN*, first load and run *RUN*'s Checksum. The screen will display a SYS number that deactivates and reactivates the Checksum. Always disable *RUN*'s Checksum before attempting to run another program. Note: You can abbreviate Basic keywords; spaces affect the checksum only when within quotes; and the order of characters affects the checksum.

With this new version, when you press return after typing in a program line, a one-, two-, or three-digit number from 0 to 255 appears in the home position. If this number matches the checksum value in the program listing, the line is correct. If the number that appears *doesn't* match the checksum value, compare the line with the magazine listing to find your error. Then move the cursor back up to the line and make your corrections. Now, after you press return, the correct checksum value should appear. Continue entering the listing until all the lines have been correctly typed. Then deactivate *RUN*'s Checksum, using the SYS number. Save the finished program.

All the graphics and control characters in the listings in *RUN* have been translated into understandable key combinations. They are the instructions you see inside the curly braces. For example, {SHIFT L} means you hold down the shift key while you press the L key. You do *not* type in the curly braces. What appears on the screen will look quite different from what is designated inside the braces. Here are some more examples:

{22 SPACEs}—press the space bar 22 times
{SHIFT CLR}—hold down the shift key and press the clr-home key
{2 CRSR DNs}—press the cursor-down key twice
{CTRL 1}—hold down the control key and press the 1 key
{COMD T}—hold down the Commodore logo key and press the T key
{FUNCT 1}—press the F1 key
{5 LB.s}—press the British pound key (*not* #) five times R

Listing 1. *RUN*'s Checksum program. This program is available on *RUN*'s BBS for users to download.

```
10 REM RUN'S CHECKSUM 64/128 - BOB KODADEK
20 MO=128:SA=3328:IF PEEK(40960)THEN MO=64:SA=4
   9152
30 FOR I=0TO169:READB:CK=CK+B:POKE SA+I,B:NEXT
40 IFCK<>20651 THENPRINT"DATA ERROR!":END
50 POKESA+110,240:POKESA+111,38:POKESA+140,234
60 PRINTCHR$(147)STR$(MO)" RUN CHECKSUM":PRINT
70 PRINT"TO TOGGLE ON OR OFF, SYS"SA:IF MO=128
   THEN 100
80 POKESA+13,124:POKESA+15,165:POKESA+25,124:PO
   KESA+26,165
90 POKESA+39,20:POKESA+41,21:POKESA+123,205:POK
   ESA+124,189
100 POKESA+4,INT(SA/256):SYS SA:NEW
110 DATA 120,162,24,160,13,173,4,3,201,24,208,4
    ,162,13,160,67,142,4,3,140
120 DATA 5,3,88,96,32,13,67,152,72,169,0,141,0,
    255,133,176,133,180,166,22
130 DATA 164,23,134,167,132,168,170,189,0,2,240
    ,58,201,48,144,7,201,58,176
140 DATA 3,232,208,240,189,0,2,240,42,201,32,20
    8,4,164,180,240,31,201,34
150 DATA 208,6,165,180,73,1,133,180,230,176,164
    ,176,165,167,24,125,0,2,133
160 DATA 167,165,168,105,0,133,168,136,208,239,
    232,208,209,169,42,32,210
170 DATA 255,165,167,69,168,170,169,0,32,50,142
    ,169,32,32,210,255,32,210
180 DATA 255,169,13,32,210,255,104,168,96,104,1
    70,24,32,240,255,104,168
190 DATA 96,56,32,240,255,138,72,152,72,24,162,
    0,160,0,32,240,255,169
200 DATA 42,208,198
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Reader Service		Page
33	Abacus Software	13
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73	Briwall	27
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81	Central Point Software	73
225	Cheatsheet Products	91
15	Computer Direct	29
214	Computer Heroes	91
166	Creative Micro Designs	91
50	Data East USA	15
154	Datel Computers	8, 9
128	Digital Vision	63
206	E.S.P. Corp.	69
3	Electronic Arts	CIII
158	Entertainment On Line	63
66	Loadstar	1
*	Lyco Computers	36–39
68	MicroProse Software	5
53	Microlllusions	CIV
98	Montgomery Grant	31
210	Oceanic America	11
*	Patech Software	2
74	Prof. Jones	78

Reader Service		Page
183	Quantum Link	CII
*	REMSOFT	78
*	RUN	
	ReRUN Subscription	17
	Productivity Pak III	48
	ReRUN Subscription	58
	GEOS Power Pak	64, 65
	ReRUN Greatest Hits	75
	ReRUN Subscription	81
	Class Ads	93–95
52	S.O.G.W.A.P. Software	91
245	Software Disc. of America	61
40	SubLogic Corp.	53
75	TC Electronics	90
179	Taito Software	6, 7
155	Tenex Computers	71
209	Tussey Computer Products	22, 23
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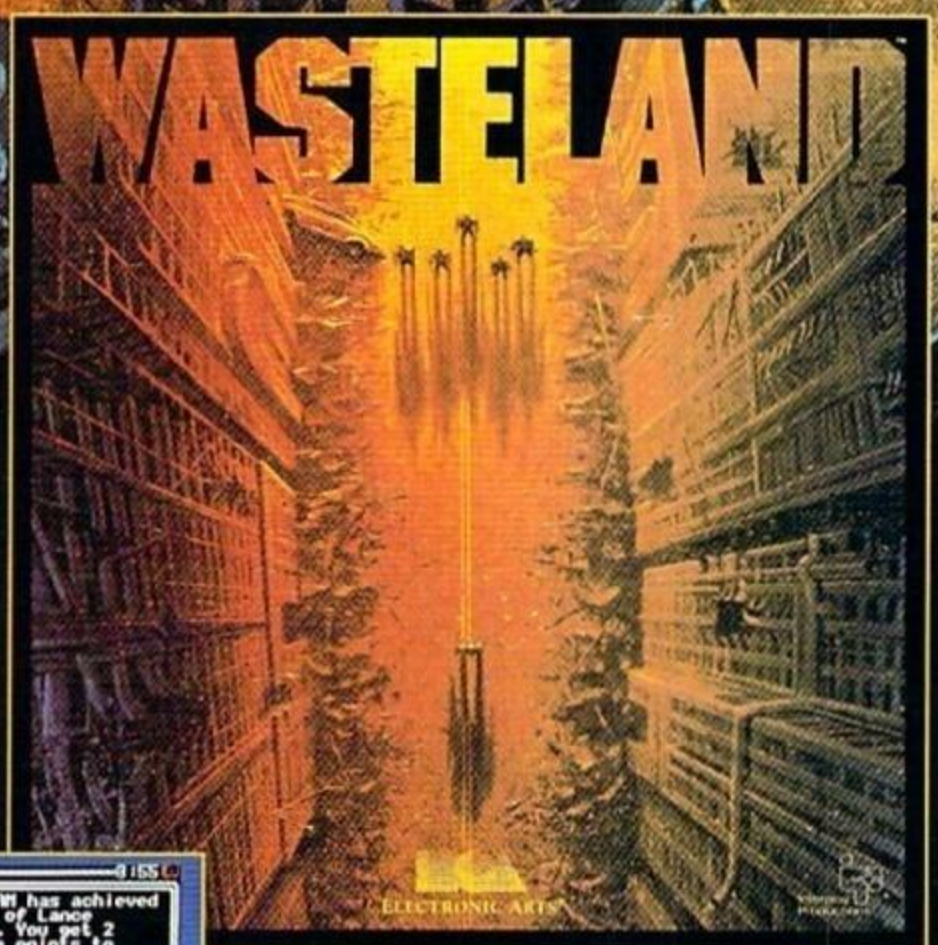

AUGUST 20, 208.

Nothing could be worse than this god-forsaken, radioactive desert.

More Sniperdroids! All tracking me with them death glares. And them Uzis. They're weird trigger-twitchin' folks. I suspect it's them poisoning the water.

Or maybe it's those Leather Thugs. Heck, I don't know anymore. I heard they have a bunch of civilians cut off east of Ranger Center, which is where I'm headed. Hope not. They want me dead. Like every other mutant this side of Vegas.

The worst part is, I'm getting to be as bad as they are. You wouldn't believe some of the ways I've learned to kill. I hang out in sewers, and my best friend is a MAC 17 submachine gun.

Gramps talked about life before the nuclear war. All I know is I don't want others living this way. Gotta rebuild this desert right. Gotta make it so you can sleep with your eyes closed.

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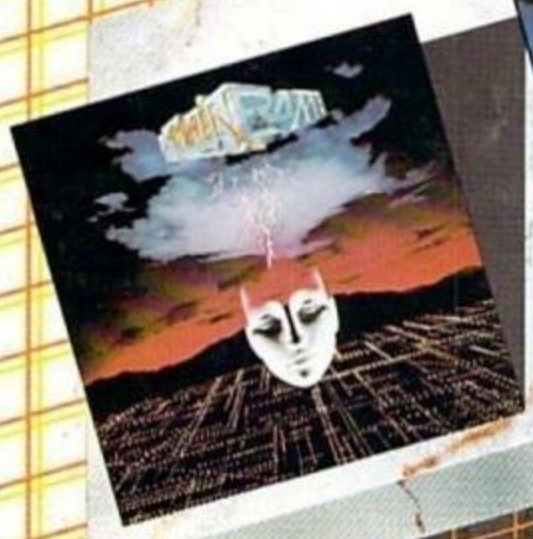

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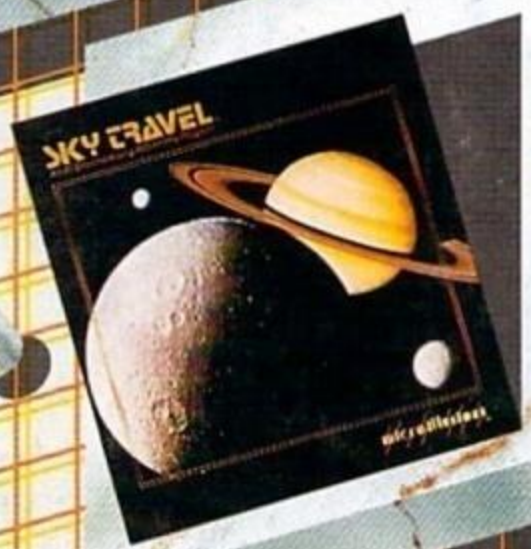

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